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ARCHIVES OF OTOLARYNGOLOGY

VOLUME 21 JANUARY 1935 NUMBER 1

CANCER OF THE LARYNX

OBSERVATIONS IN TWO HUNDRED CONSECUTIVE CASES

GABRIEL TUCKER, M.D.

PHILADELPHIA

The study of a series of 200 cases of cancer of the larynx grouped in the order in which the patients came for examination gave data on the points that are usually considered in the study of laryngeal cases, which I believe may be of interest to laryngologists. In presenting these observations nothing new or final is claimed. The patients were referred to the bronchoscopic clinics of the University of Pennsylvania primarily for diagnosis.[1] A number of the patients were sent back to the referring physician for treatment, either surgical, by irradiation or palliative only, as indicated in the particular cases. In many of the cases the condition was far advanced when the patient presented himself for examination, and no treatment other than palliative could be given. In the consideration of the data obtained from this study, therefore, the work of a number of surgeons and roentgenologists has been included, and in this way an analysis represents a cross-section of methods of treatment and results rather than the method and result of any one physician or clinic.

In every case routine studies, including the taking of a complete history, general physical examination, serologic tests, a Wassermann test, roentgenologic study of the neck, chest and esophagus, examination of the nose and throat and careful mirror study of the larynx and pharynx, were made, and finally direct examination of the larynx, hypopharynx and esophagus, with biopsy of the lesion, was made in every case in which it was necessary, in order to determine the location and

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Read before the American Laryngological, Rhinological and Otological Society, Inc., Charleston, S. C., April 4, 1934.

From the bronchoscopic clinics of the University of Pennsylvania, the Hospital of the University of Pennsylvania and the Graduate Hospital of the University of Pennsylvania.

1. Dr. Chevalier Jackson, my former chief in the Hospital of the University of Pennsylvania and the Graduate Hospital of the University of Pennsylvania, permitted the use of the records of cases referred during his service and follow-up notes. Numerous referring physicians supplied much of the follow-up data used in this study.

extent of the lesion. The data obtained are summarized in regard to the following points:

Race	
White	196 cases, or 98 %
Negro	4 cases, or 2 %
Sex	
Male	183 cases, or 91.5%
Female	17 cases, or 8.5%

The incidence of cancer of the larynx in the following decades of life was noted:

20 to 29 years	2 cases, or 1 %
30 to 39 years	12 cases, or 6 %
40 to 49 years	26 cases, or 13 %
50 to 59 years	69 cases, or 35.5%
60 years and over	91 cases, or 45.5%

PREDISPOSING CAUSES

Vocal Abuse.—In 82 cases (intrinsic cancer) it was found that the patient used the voice excessively in his work or vocation. Vocal abuse was, therefore, a factor in 41 per cent of the total number of cases.

Tobacco.—The excessive use of cigarets and tobacco in other forms was found in 25 cases, or 12.5 per cent.

Exposure to the Roentgen Rays (?).—In 1 patient after excessive (?) exposure to the roentgen rays for the treatment of tuberculous glands of the neck cancer of the skin, with ulcerative laryngitis, developed. Tissue removed from the ulcer in the larynx showed squamous cell carcinoma. The causal relation of irradiation and the development of cancer of the larynx is uncertain.

PRECANCEROUS CONDITIONS

Papillomas.—Papillomas which had recurred for some time were followed by cancer in the same location in 2 cases.

Keratosis.—Keratosis and leukoplakia occurred in the larynx in the location in which cancer subsequently developed in 2 cases. In 1 case there had been extensive leukoplakia of the tongue for ten years; the same type of lesion developed in the larynx, and biopsy showed beginning cancer.

Chronic Inflammatory Change.—A chronic inflammatory process with granuloma formation preceded the development of cancer in 1 case. An inflammatory mass was removed by direct laryngoscopy, and four years later the patient showed squamous cell carcinoma in the same location.

COMPLICATING AND CONCURRENT DISEASE

The following instances of complicating and concurrent pathologic conditions were noted: cancer of the larynx with tuberculosis of the larynx and lungs, 1 case; cancer of the larynx with tuberculosis of the lungs, 8 cases; cancer of the larynx with evidence of syphilitic infection, 7 cases; cancer of the larynx, pulmonary tuberculosis, constitutional syphilis and diabetes, 1 case; cancer of the larynx (intrinsic) and cancer of the esophagus (middle third), 1 case (on histologic examination basal cell cancer with a different type of cell at each location was found), and cancer of the larynx, pulsion diverticulum of the esophagus and constitutional syphilis, 1 case.

SYMPTOMS

Hoarseness or local discomfort or both were found in every case. Hoarseness occurred in 176 cases, or 88 per cent of the entire group. The duration of the hoarseness was as follows:

6 months or under	54 cases
6 months to 1 year	46 cases
1 year and over	76 cases

Local discomfort was of most significance in the extrinsic cases. In many of the intrinsic cases, however, the patient complained of an abnormal sensation in the larynx.

Dyspnea was noted in 41 cases and dysphagia in 58. Dyspnea and dysphagia occurred practically always in advanced lesions and were accompanied by evidence of metastasis and adenopathy.

Pain, both local and referred, was noted only when the disease was well advanced.

CLASSIFICATION

The usual divisions with reference to the site of the lesion were used in the classification, namely, intrinsic, extrinsic and mixed.

1. *Intrinsic Cases.*—In the 119 cases of this type, or 59.5 per cent of the series, the lesion involved the right vocal cord in 52 instances, the left vocal cord in 48, both cords in 11, the anterior commissure in 36 and the subglottic larynx in 51.

In this tabulation overlapping occurs because of extension of the lesion, more than one location being involved in the particular case and the exact point of origin being in doubt many times.

2. *Extrinsic Cases.*—The number of cases of this type was 56, or 28 per cent of the series. The pyriform sinuses were involved in 23 cases, the epiglottis in 12 and the postcricoidal region in 15; a pedunculated cancerous tumor was found attached to the arytenoid cartilage in 3 cases. In the cases of involvement of the postcricoidal

region 10 of the patients were males and 5 were females—a ratio of 2 males to 1 female—reversing the usual occurrence of greater frequency in women than in men.

3. *Mixed Cases.*—In the 25 cases of this type, or 12.5 per cent of the series, it is probable that the origin of the lesion was intrinsic. If this is so considered, it would justify classification of these cases at the time the lesion started as intrinsic, making 144 cases, or 72 per cent of the entire series, intrinsic in origin.

EXTENT OF THE LESIONS

The extent of the lesion in each case in this series was determined by mirror laryngoscopy, direct laryngoscopy and roentgenologic examination. In the operative cases at laryngofissure the lesion was always inspected after opening the larynx. In the cases in which laryngectomy was performed the lesion was always inspected after the larynx was removed, and in some cases the larynx was opened before removal in order to determine the exact procedure that should be followed. Roentgenologic study gave evidence of a lesion in the larynx in practically every case. A diagnosis of cancer of the larynx cannot be made unequivocally by the roentgen rays, but the correlation of roentgen findings, mirror examination and direct examination gives an accurate determination of the exact location and extent of the lesion.

METASTASIS AND ADENOPATHY

Metastatic extension was evident in 61 cases, or 30.5 per cent.

PATHOLOGY

Biopsy by direct laryngoscopy was done in every case. If it showed no abnormality and if the clinical findings indicated that the lesion was cancer, two or more biopsies were performed until a positive finding was obtained. The incidence of the types of cancer found was as follows:

Squamous cell carcinoma	191 cases,	or 95.5%
Basal cell carcinoma	8 cases,	or 4 %
Sarcoma	1 case,	or 0.5%
Total	200	

Biopsy produced no complication or untoward result in any case in this series, nor was there any indication that early metastasis was produced by it. In each of the last 100 cases classification according to Broder's method of grading was made. It is believed, however, that this is not nearly as important a consideration in selecting the method of treatment as is the determination of the location and extent of the lesion.

TREATMENT

In this series of cases the location and extent of the lesion were used as the basis for the selection of the proper surgical procedure. One hundred and twelve cases, or 56 per cent, were recommended as suitable for surgical treatment. Six patients refused operation. Surgical treatment was given as follows:

Laryngofissure.—This was performed in 58 cases, with no mortality due to the operation. In the case of sarcoma recorded the growth was removed by laryngofissure, using the technic for growths of the anterior commissure; there was no recurrence after two years. Recurrences followed laryngofissure in 8 cases, or 14 — per cent. In all recurrences laryngectomy was advised. Three patients refused laryngectomy. In 5 cases laryngectomy was done, with 1 recurrence with death from cancer. Four patients were cured by this operation.

Total Laryngectomy.—This was performed in 31 cases, with 3 postoperative deaths. Recurrences occurred in 11 cases, or 37 + per cent. Each patient received treatment by irradiation following recurrence after laryngectomy.

Partial Laryngectomy.—This was performed in 17 cases, with no mortality following the operation. Thyrochondrotomy with wide resection of the interior of the larynx was done in each case.

In the more recent cases a laryngostomy opening was maintained in the front of the larynx, and radium was applied within the larynx during the first week after the operation. Recurrences occurred after partial laryngectomy in 11 cases, or 64 per cent. Direct laryngoscopic removal of the tumor, with external application of the roentgen rays and radium was carried out in 3 cases (extrinsic cancer) in which a pedunculated tumor was attached to the arytenoid cartilage. In these cases there have been no recurrences after three years.

Tracheotomy was performed 39 times for dyspnea in this series of cases and 15 times as a part of the operative procedure of partial laryngectomy, total laryngectomy or laryngofissure.

Irradiation.—In every case of recurrence after surgical treatment applications of the roentgen rays or radium were used. The available records showed that 54 patients were given roentgen and radium treatment under the direction of skilled radiologists. In 3 cases of extrinsic cancer in which no form of surgical treatment was used, 3 cures were reported, 1 of more than three years' duration. Following the advice of the late Dr. MacKenty, laryngectomy was not attempted in any case after extensive external irradiation. In 1 case partial laryngectomy was attempted after external irradiation, which was followed by perichondritis and recurrence. Death from cancer occurred within six months.

SUMMARY AND COMMENT

The fact that only 2 per cent of these cases occurred in Negroes is worthy of note, although practically all the patients came from districts where there was a large colored population. All the Negroes (4) died of cancer. In 2 cases the condition was inoperable when first seen. One patient died of a new growth of cancer three and a half years following laryngofissure; the physician considered this cancer a new growth and not a recurrence. The patient refused laryngectomy and died of cancer. The fourth patient had received extensive irradiation prior to partial laryngectomy and died of perichondritis and recurrence.

About the usual ratio of occurrence in males and females is shown in the series. In the cases of cancer of the postcricoidal region, however, the ratio is reversed. In the 15 cases of cancer of postcricoidal origin 10 of the patients were males, and 5 were females.

The youngest patient was a woman 26 years of age. She has had no recurrence six years following laryngofissure. Almost 50 per cent of the patients were over 60 years of age when the diagnosis of cancer of the larynx was made.

Vocal abuse or the excessive use of tobacco were probably predisposing causes in more than 50 per cent of the cases. Excessive exposure to the roentgen rays is questionable in 1 case.

Papillomas, keratosis, leukoplakia and chronic localized inflammatory diseases are noted as precancerous conditions.

One case of cancer and tuberculosis in the same location in the larynx, which was proved histologically, is worthy of note.

In 1 case early cancer in the larynx and cancer in the midthoracic part of the esophagus, which was much more extensive, occurred at the same time, and neither lesion was believed to be metastatic.

Hoarseness and local discomfort or both are shown by this series to be the most valuable diagnostic leads to early diagnosis. Dysphagia, dyspnea and pain, either local or referred, were late symptoms and showed hopelessly late involvement in most cases.

The usual classification is probably the most valuable, because it is used as the basis for the various surgical procedures, laryngofissure and laryngectomy. Fifty-nine and five-tenths per cent of the cases were intrinsic, and if one adds to this another 12.5 per cent, or the 25 cases which were classed as mixed, this gives 72 per cent of the cases in this series in which the condition would have been amenable to surgical treatment had it been diagnosed in the beginning of the disease. In other words, there were probably 144 cases of intrinsic origin in the 200 in the series. In a large portion of these cases the lesions were anterior and intrinsic and would have been amenable to laryngofissure had they been discovered early, before the lesion had extended.

The location and extent of the lesion are the most important considerations in determining the method of surgical treatment. Histologic grading according to Broder's method should be done and is of particular value in determining the cases that are suitable for treatment by irradiation.

Laryngofissure performed after the technics of Jackson and St. Clair Thomson was used in this series of cases. The technic of Jackson for growths of the anterior commissure should be mentioned because it is particularly used for a type of lesion which was formerly subjected to total laryngectomy. In 6 cases of my own in this series cure for more than five years was obtained by the use of this technic for growths of the anterior commissure.

Laryngectomy was done after the technic of MacKenty's one-stage operation, unless preliminary tracheotomy had been necessary for the relief of dyspnea. Following laryngectomy a number of the patients had good voices, and those who had not were able to use the MacKenty artificial larynx with great satisfaction. In no case following laryngectomy did any patient show melancholic tendencies because of the loss of the larynx.

Partial laryngectomy by the technic of thyrochondrotomy of Sir St. Clair Thomson, with wide excision of the affected area, was performed on a number of patients who refused laryngectomy and in several instances in which the patient's general condition would not permit total laryngectomy. The surgical treatment was supplemented in several cases by the intralaryngeal use of radium within the first week following partial laryngectomy. A laryngostomy opening was maintained in the front of the larynx and radium was placed within the larynx above a previously inserted tracheotomy tube. With this technic of application of radium there have been no recurrences in 3 of the patients after three years.

In this series I believe that it is unfair to attempt to make any estimate of results of treatment by irradiation, because it was impossible to obtain reliable data in many cases regarding the method of application and the amount of the roentgen rays and radium used. Three cures of more than three years' duration of extrinsic cancer by irradiation should be noted.

CONCLUSIONS

1. The study confirms the already well established fact that the early symptoms of cancer of the larynx are two in number: (*a*) hoarseness and (*b*) local discomfort. One or both of these symptoms occurred in every case in this series while the disease was in an early stage.

2. The study confirms the belief that a large proportion of all cases of cancer of the larynx are intrinsic in origin. In this series 144 cases

of the 200 investigated, or 72 per cent, were probably of intrinsic origin.

3. A plea for early diagnosis is emphasized in the data from this series. In at least 75 per cent of the cases the condition would have been amenable to surgical cure by the generally used technics of laryngofissure and laryngectomy if the laryngologists who referred the patients for examination had been able to see the patients while the disease was still in an early stage. Education of the laity and the general practitioner is the next step in the solution of the problem of the cure of cancer of the larynx.

326 South Nineteenth Street.

HAY FEVER AMONG JAPANESE: II

H. J. HARA, M.D., M.Sc. (MED.)
LOS ANGELES

In a previous communication it was stated that hay fever is unknown in Japan; that on American soil 3.5 per cent of the Japanese population contract this disorder; that scores of these patients, when they return to their native land, are free from symptoms during their stay in Japan, and that on their return to America the symptoms invariably reappear after a year or two. It was also noted that there was no marked change in the dietary habits of the patients in either country.

It has been stated by some American allergists that only a comparatively small number of American rhinologists are able to diagnose correctly a case of hay fever when they encounter it. These allergists would have one believe that this may be equally true of their Japanese colleagues. Granting that there are thousands of native physicians who have never seen a case and who would be likely to overlook such a case if they met with it, those with whom I communicated and who denied the presence of hay fever among the natives are physicians of unusual ability and wide clinical experience. They are perhaps the best representatives in the regions in which they are located. Among these, mention may be made of such well known international authorities as Prof. Dr. Ino Kubo of Kyushu Imperial University, Prof. Dr. T. Masuda of Tokyo Imperial University, Prof. Dr. H. Kosokabe of Hokkaido Imperial University, Dr. K. Masuyama of Taihoku Medical College of Formosa and Dr. Hideo Suko of Seoul Medical College, Seoul, Korea. Each of these has spent years in the leading clinics of Europe and America. They have had ample opportunity to come in contact with patients with hay fever and become familiar with the symptom complex.

WEATHER CONDITIONS OF JAPAN

The type, abundance and duration of growth of vegetation are primarily governed by the combination of edaphic, climatic and topographic factors. Temperature, precipitation, humidity, air motion and

The study was carried out with the cooperation of Dr. B. N. Colver of the College of Medical Evangelists.

This article was submitted to the Faculty of Otolaryngology of the Graduate School of Medicine of the University of Pennsylvania in partial fulfilment of the requirements for the degree of Doctor of Medical Science (D.Sc. [Med.]) for graduate work in otolaryngology.

the amount of sunshine are among the most important of these factors.

On the eastern coast of the Asiatic continent there are two outstretched arms of a peninsula—Kamchatka on the north and Malaysia on the south. Between them lies a long cluster of islands which constitutes the Japanese Empire. The island of Formosa brings it within easy reach of the Malayan archipelago, and the Kuril Islands are but a few miles from the tip of Kamchatka. Japan proper is a narrow

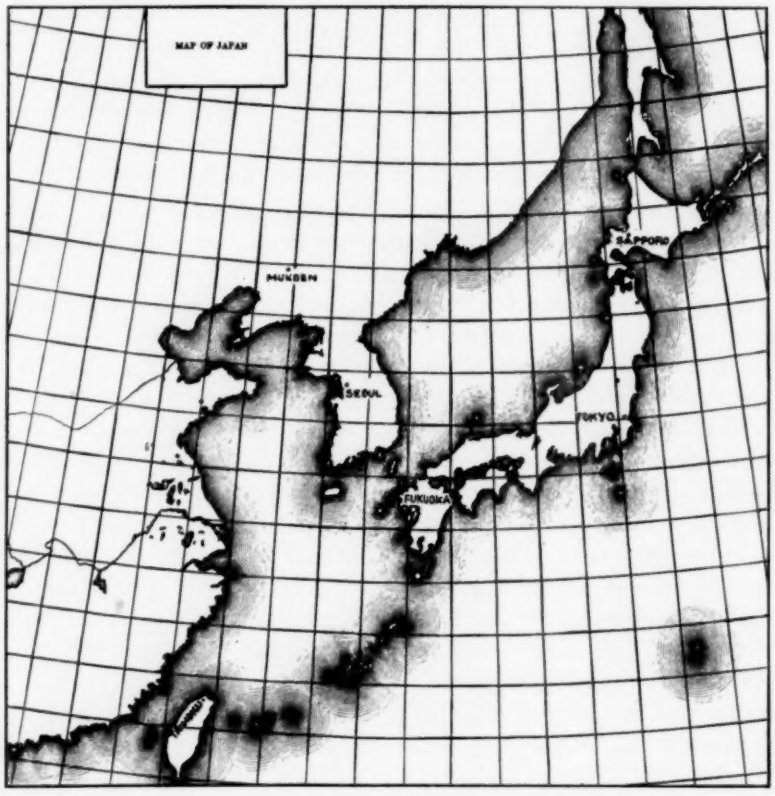

Fig. 1.—Map showing six centers in Japan selected for study.

strip of territory from 50 to 200 miles (80.5 to 321.7 kilometers) in width. A series of mountain ranges runs along its long axis. The entire area is not as large as the state of California, but because of its length, if placed along the Pacific coast of North America, would extend from Vancouver, B. C., to the southern border of Mexico. Because of this great extension north and south, one finds semi-arctic, subtropical and tropical climates. The map shows the six important centers of population of Japan selected in this investigation, which afford unusual opportunities for the comparative study of the various zones. The sum-

mer is short, hot and humid, similar to that of the Middle West in America, with frequent thunder-storms followed by heavy rains. The winter is long, cold and clear. The equatorial current helps to maintain an atmosphere much warmer than that of corresponding latitudes of the neighboring continent. The average number of frosty nights in Tokyo is not more than 60; in Sapporo there are 145, while in Taihoku frost

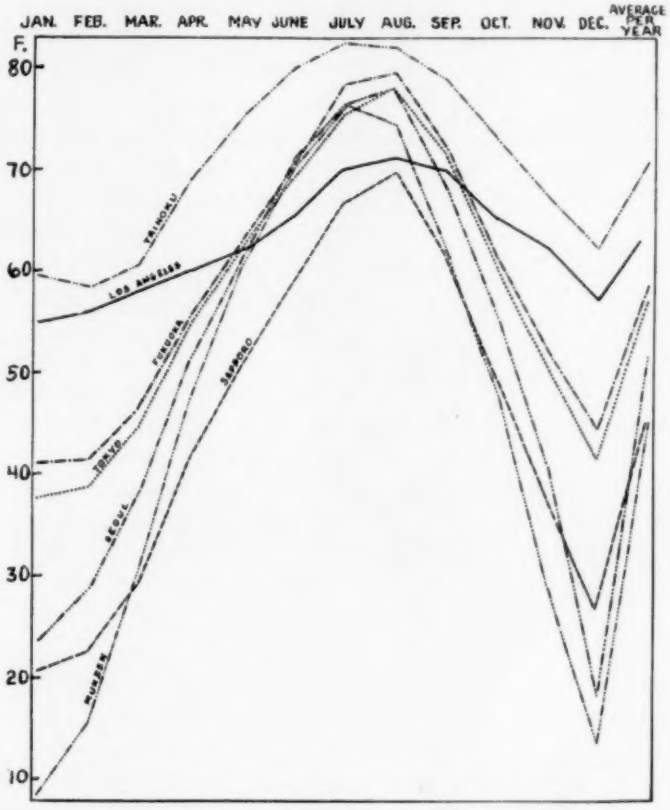

Fig. 2.—Monthly variation of temperature in six Japanese cities, compared with that in Los Angeles.

is unknown. In Seoul, the old capital of Korea, there were 91 frosty nights in 1929, while in Mukden on the continent there were 134 the same year. The daily variation in temperature is generally less than that of other countries having the same latitude, being greatest in January and least in July.

Figure 2 shows the monthly variation of temperature in six cities in Japan, compared with that of Los Angeles, as given by the government meteorologic offices, extending over nearly fifty years. It may

be noted that the variation between the summer and winter temperatures in Los Angeles does not exceed 17 degrees (Fahrenheit). The temperatures of Taihoku, in Formosa, and Los Angeles, run nearly parallel, but on account of the tropical situation of the former, its average temperature is nearly 10 degrees higher than that of the latter city. The temperatures of Fukuoka, Tokyo, Seoul and Sapporo run almost

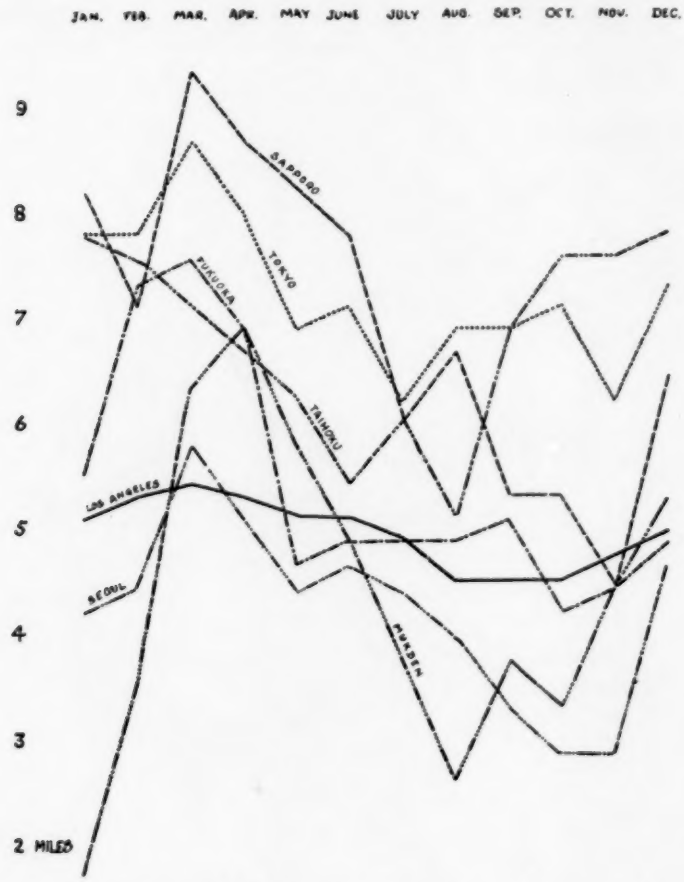

Fig. 3.—Velocity of the wind (average per hour) in six Japanese cities during one year, compared with that in Los Angeles.

parallel, the lowest temperature being in January and the highest in August. Mukden shows the greatest variation in winter and summer, similar to continental conditions in America. Thus it may be understood why, except in the island of Formosa and the southern part of Kyushu, the pollinating season is much shorter than in Los Angeles.

Pollens that are concerned in the production of hay fever must be anemophilous, or wind-borne. To a considerable extent, the air motion

determines the pollen content of the air. It has been repeatedly found that light, buoyant pollens may be carried many miles by air currents. There are several factors in air motion that influence the pollen content. Daily periodicity, altitude, seasonal variation and direction of the wind in some regions are all important. When a large body of water is nearby or a strip of land is surrounded by ocean, as in the case of Japan, the wind blowing from the water carries less pollen than that blowing from the land. The velocity of the wind must be the final recorded vital factor. Other things being equal, the greater the speed of air motion the greater increase there is in the number of pollens in the air which are capable of reaching and irritating the nasal mucosa.

Figure 3 shows a comparative study of the velocity of the wind in six cities. The most significant feature appears to be the uniformity of air motion in Los Angeles the year round, while the cities of the Orient show considerable seasonal variation.

In addition to fertile soil, for the abundant growth and development of vegetation the amount of rainfall must be not only plentiful but fairly evenly distributed throughout the year. Experience has shown that for the purification of the air a slow rain over a period of two or three days accompanied by cloudy weather frees the air from pollens more completely than a short torrent of rain in greater volume followed by a day of high wind and warm sunshine.

A seasonal variation in precipitation plays an important part in the pollen content of air. The rainfall in winter may have little influence on the purification of the air, while a copious rainfall in the spring and summer increases the size of the plants, and this is a vital factor in the determination of the amount of pollen which they produce.

In Los Angeles the annual rainfall is less than 15 inches (381 mm.), and rainy days are limited to 38. The rainfall begins to increase after the middle of October, is most abundant in February and March and rapidly declines during the following months. The scarcity of rain during the pollinating season keeps the air filled with pollens in this region. The city of Sapporo, on the other hand, the precipitation curve of which runs parallel to that of Los Angeles but on a higher level and in which rainfall also occurs during the fall and winter, has a pollinating season limited to a few months of the spring and summer, owing to its northerly situation. Even during this period the rainy days average about from 12 to 14 each month, and the annual rainfall is 40 inches (1,016 mm.), insuring a prolific growth of plants and vegetation.

There are three wet seasons in and about Tokyo: (1) from the middle of April to the beginning of May; (2) from the middle of June to the beginning of July, and (3) the heaviest, from early in September to early in October. January is the driest, and September the wettest,

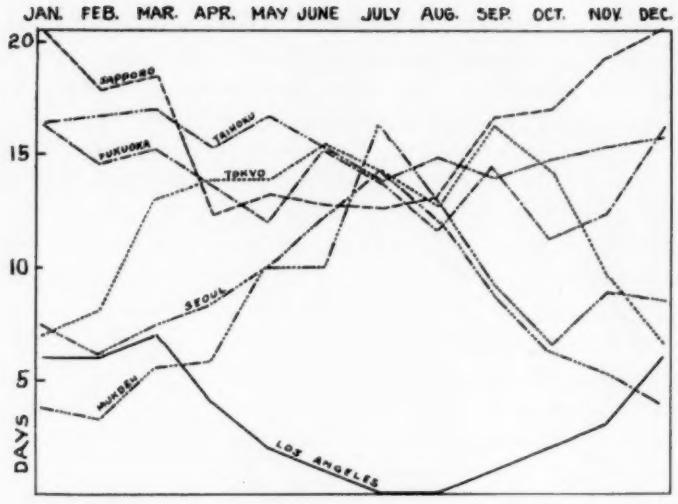

Fig. 4.—Number of days of rainfall in six Japanese cities during one year, compared with that in Los Angeles.

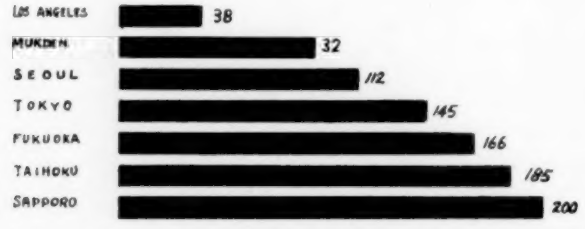

Fig. 5.—Average number of days of rainfall in six Japanese cities during one year, compared with that in Los Angeles.

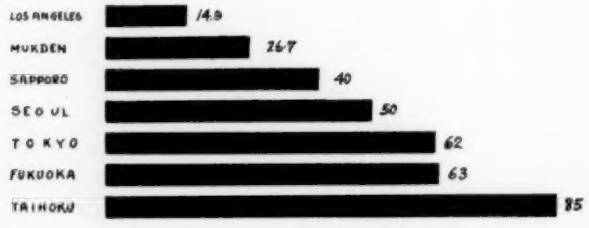

Fig. 6.—Average yearly precipitation in inches in six Japanese cities during one year, compared with that in Los Angeles.

month. During the four months from November to February, inclusive, about 18 per cent of the yearly rainfall occurs. Japan is emphatically a wet country, so far as quantity of rainfall is concerned, the average for the whole country being 1,577 mm. (63 inches) per annum, yet there are about 4 sunny days for every 3 of rain or snow, the actual

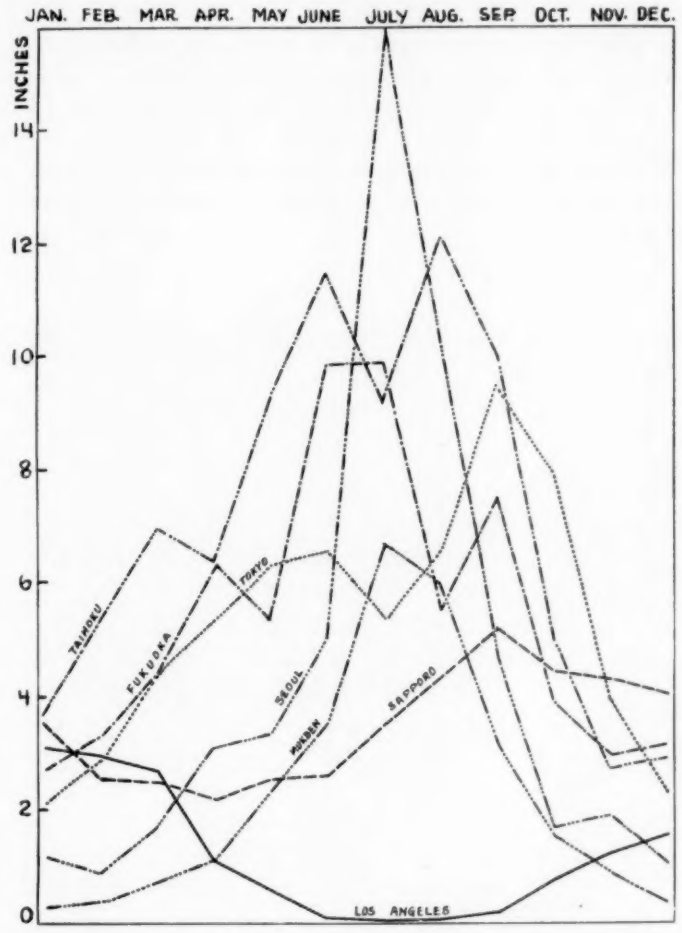

Fig. 7.—Average monthly precipitation in inches in six Japanese cities, compared with that in Los Angeles.

figures being 156 days of snow or rain and 215 days of sunshine (figs. 4, 5, 6 and 7).

Humidity is closely related to the amount of precipitation in influencing the incidence of hay fever. The salutary effect of a dry climate in the treatment of bronchial asthma has long been recognized. A warm, dry atmosphere is infinitely better adapted to carry the wind-borne

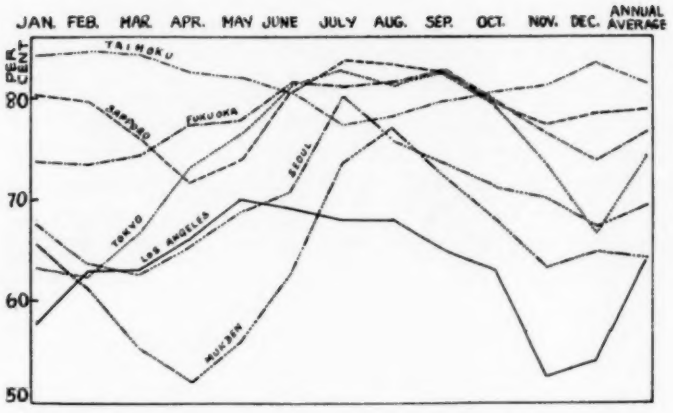

Fig. 8.—Relative humidity in six Japanese cities during one year, compared with that in Los Angeles.

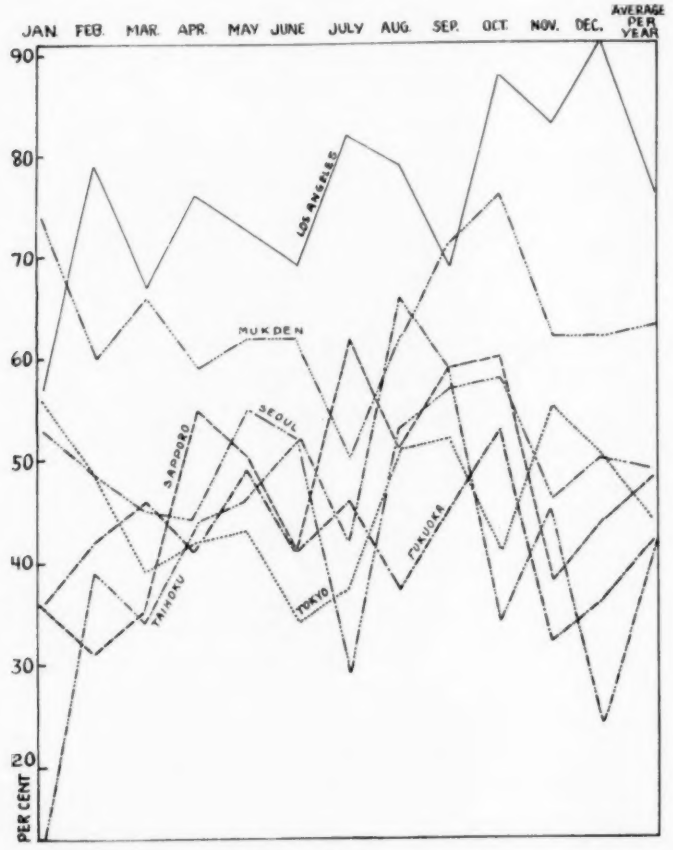

Fig. 9.—Percentage of sunshine in six Japanese cities during 1930, compared with that in Los Angeles.

pollens than is the damp, humid atmosphere in the flowering season of Japan (fig. 8).

Pollination is most inactive on cloudy days. Balyeat [1] stated that during a period in which sunshine is 100 per cent or nearly 100 per cent, even if the rainfall is fairly great, the pollen content is high; but if the rainfall is zero and the percentage of sunshine low, the pollen content is relatively low. The absence of the lighter, buoyant pollens and the comparatively larger number of heavier ones in the air of Japan, as will be shown presently, may be accounted for by the fewer days of sunshine and the copious rainfall during the late spring and summer months. In Los Angeles, on the contrary, there are from 11 to 18 days of cloudless sunshine every month of the year, which favors the distribution of lighter pollens, though the growth of weeds and grasses may be limited on account of lack of moisture in the soil (fig. 9).

VEGETATION OF JAPAN

No country can boast of such a wealth and variety of trees and shrubs per square mile as can Japan. Because of her natural proximity to the continent of Asia, without doubt, great numbers of plants were carried over to join the endemic flora of Japan, and all found suitable homes amid varying conditions of climate and physiography. All vegetation, however, does not produce hay fever. According to Thommen,[2] in the entire botanic kingdom there are 233,000 different kinds of plants, which can be divided into the following classes:

1. Flowerless plants		100,000
Algae and fungi	80,000	
Mosses	16,000	
Ferns	4,000	
2. Flowering plants		133,000

Theoretically, there are, then, 133,000 kinds of plants which when pollinating are a possible source of hay fever.

In an article of this nature an exhaustive study of the botany of Japan is impracticable and unnecessary. A list of the most common plants and trees causing hay fever in America and particularly in Southern California was submitted to Prof. Kwan Koriba, R.G., R.H., head of the department of botany of Kyoto Imperial University. He is a recognized authority on plant life of Japan. The table indicates the plants that are common to both countries and the quantities present in Japan. The outstanding plants causing hay fever in Southern California, such as Bermuda grass (Capriola dactylon) and ragweed

1. Balyeat, Ray M.: Hay Fever and Asthma, Philadelphia, F. A. Davis Company, 1928.

2. Thommen, A. A.: The Etiology of Hay Fever; Studies in Hay Fever, New York State J. Med. **30**:437, 1930.

(Ambrosia elatior), are absent in Japan. There are several other wind-borne pollinating plants which are almost equally important from the standpoint of hay fever that are numerous in Japan. The number of pollens from these and other plants that are present in the air in the two countries is presented in the following section.

Common Hay Fever-Producing Plants of Southern California Which Are Also Found in Japan

Species	Common Name	Relative Number of These Plants in Japan
Trees (Cultivated)		
Acacia floribunda	Everblooming acacia	+
Acer negundo	Box-elder	+
Betula alba	White birch	++
Celtis occidentalis	Western hackberry	+
Citrus aurantium	Orange	+++
Eucalyptus species	Eucalyptus	+
Melia azedarach	Umbrella-tree	++
Olea europea	Olive tree	+
Platanus orientalis	European plane-tree	++
Sequoia sempervirens	Redwood	+
Thuja occidentalis	Arbor-vitae	+
Weeds and Shrubs		
Amaranthus retroflexus	Redroot pigweed	+
Beta vulgaris	Beet (escape)	+
Brassica campestris	Yellow mustard (common)	++
Brassica nigra	Black mustard	+
Chenopodium album	Lamb's-quarters	++
Helianthus annuus	Wild sunflower	+
Plantago lanceolata	English plantain	+
Plantago major	Common plantain	++
Rumex acetoselia	Sheep-sorrel	++
Rumex crispus	Curly dock	++
Solanum nigrum	Black nightshade	+
Ricinus communis	Castor bean	++
Typha latifolia	Cattail	++
Ustilago avenae	Oat smut	+
Grasses		
Agrostis palustris (alba)	Redtop	+
Anthoxanthum odoratum (cult.)	Sweet vernal grass	++
Avena barbata	Slender wild oat	+
Avena fatua	Wild oat	++
Avena sativa	Cultivated oat	++
Bromus unioloides	Rescue-grass	+
Dactylis glomerata	Orchard-grass	++
Festuca elatior	Meadow fescue-grass	+
Festuca rubra	Red fescue-grass	++
Hordeum murinum	Wall barley	+
Hordeum vulgare	Cultivated barley	+++
Koeleria cristata	Koeler's grass	++
Lolium multiforum	Italian ray-grass or rye-grass	+
Lolium perenne	English or perennial rye-grass	+
Panicum miliaceum	Hog millet	++
Paspalum distichum	Joint-grass	+
Poa annua	Annual blue grass	+++
Poa pratensis	Kentucky blue grass or June grass	+++
Polypogon monspeliensis	Annual beard-grass	+
Triticum sativum	Cultivated wheat	+++
Zea mays	Corn	++

POLLEN COUNT OF THE AIR IN LOS ANGELES

Several investigators [3] in this country have made excellent contributions on the concentration of pollen in the air. This was done by

3. Selfridge, Grant, and Hall, H. M.: Spasmodic Vaso-Motor Disturbances of the Respiratory Tract, with Special Reference to Hay Fever, California State J. Med. **16**:164 (April) 1918. Selfridge, Grant: Vaso-Motor Disturbances of the Nose, with Special Reference to Hay Fever, Laryngoscope **30**:611 (Oct.) 1920.

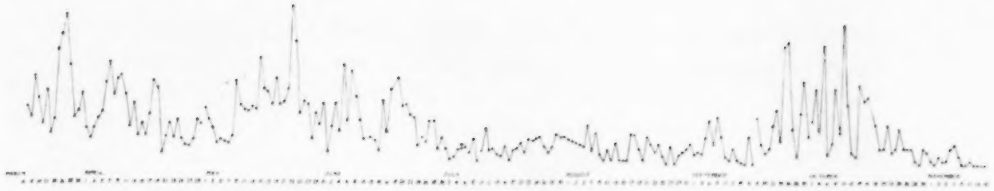

Fig. 10.—Average pollen content of the air in Los Angeles from March 15 to Nov. 15, 1932. Figures 100 to 500 refer to the number of pollens counted each day on slides measuring 1 by 3 inches (2.54 by 7.62 cm.). Each slide was studied under low power magnification by the use of the mechanical stage from left to right ten times, and all the pollens encountered during these studies were enumerated.

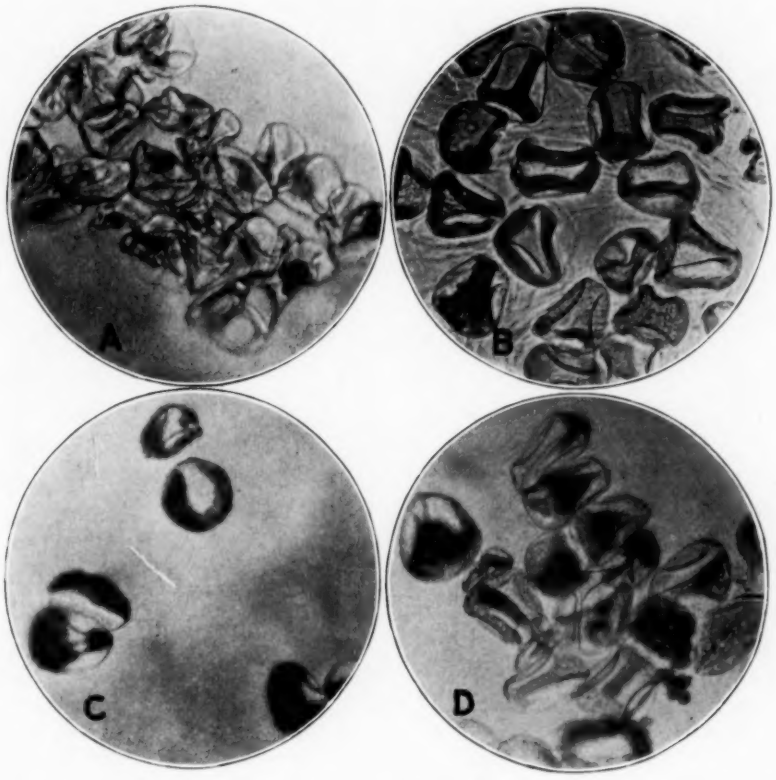

Fig. 11.—Los Angeles pollens: *A*, Capriola dactylon (Bermuda grass), from February 25 to December 1; 64 per cent of the patients reacted. *B*, Festuca rubra (red fescue grass), from April 15 to September; 62 per cent of the patients reacted. *C*, Poa pratensis (Kentucky blue grass, or June grass), from April 25 to September 1; 64 per cent of the patients reacted. *D*, Anthoxanthum odoratum (sweet vernal grass), April and May; 54 per cent of the patients reacted. Magnification, × 350.

exposing oil-smeared glass slides to the air during the pollinating season in the communities in which these workers were particularly interested.

Daily, from March 15 to Nov. 15, 1932, oil-coated slides were exposed to the air in Los Angeles, one being placed on the roof of a three-story service building of the White Memorial Hospital, an elevation of about 500 feet (165.1 meters) above sea level, while another was placed in my garden on a lower level. The pollen count was taken

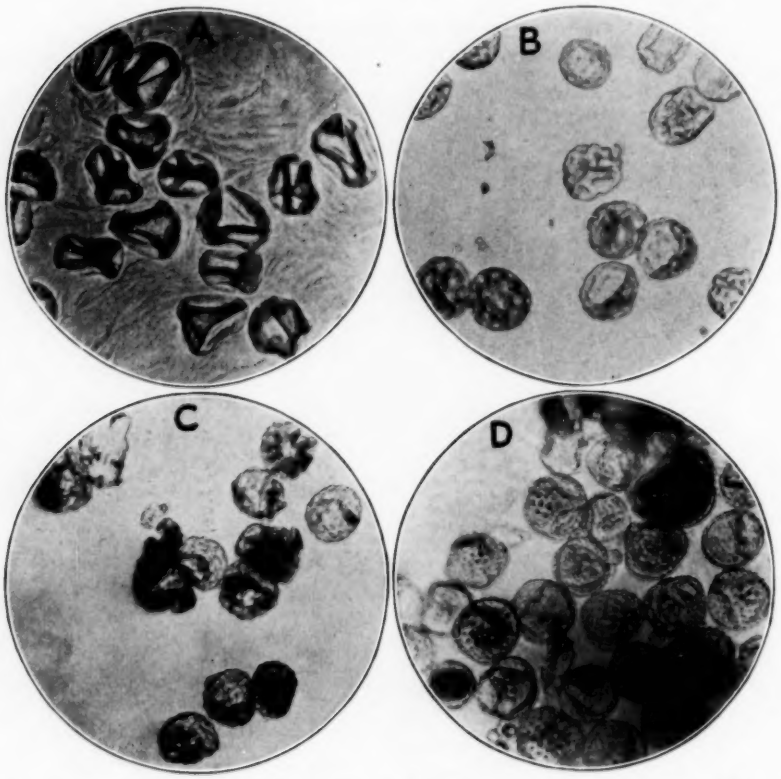

Fig. 12.—Los Angeles pollens: *A*, Agrostis palustris (redtop), from May 25 to September; 51 per cent of the patients reacted. *B*, Amaranthus retroflexus (redroot pigweed), from April 25 to December; 45 per cent of the patients reacted. *C*, Salicornia ambigua (pickleweed), from June to October 15; 51 per cent of the patients reacted. *D*, Franseria bipinnatifida (beach ragweed sandbur), from May to October; 45 per cent of the patients reacted. Magnification, × 350.

under a low power microscope, using a mechanical stage; the slide was read from left to right ten times. Because of the long pollinating seasons in Southern California, which overlap, all the pollen was counted. Figure 10 shows the average pollen count of Los Angeles from March 15 to November 15.

Three pollinating seasons were observed.[4] Owing to the temperate climate, trees begin to pollinate about the middle of January. These include walnut, oak, cottonwood and acacia. Many of the patients studied live in the country and are in contact with these. Therefore, trees play an important part in hay fever. Most of the trees continue to bloom until March, at which time the second period begins, with a

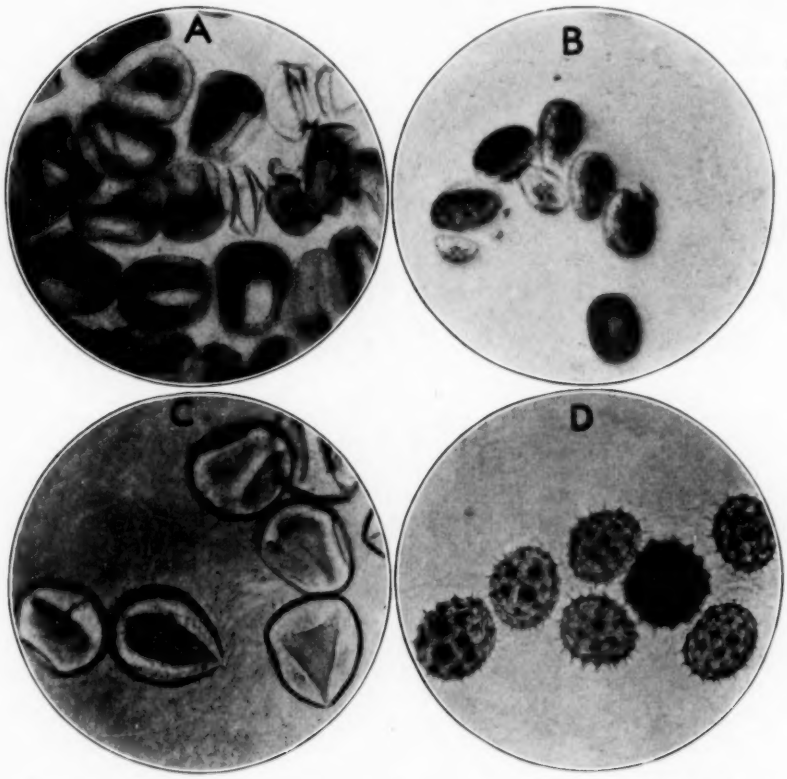

Fig. 13.—Los Angeles pollens: *A*, Paspalum distichum (joint-grass), from June to October; 45 per cent of the patients reacted. *B*, Artemisia californica (hill or coast sage-brush), from August 15 to November; 43 per cent of the patients reacted. *C*, Hordeum murinum (wall barley or foxtail), from March to September; 45 per cent of the patients reacted. *D*, Helianthus annuus (wild sunflower), from April to December; 40 per cent of the patients reacted. Magnification, × 350.

profuse outpouring of pollens—conspicuously, of Bermuda grass (Capriola dactylon), ray-grass (Lolium perenne) and orchard-grass (Dactylis glomerata). These plants pollinate practically the year round. The third season begins at the end of June and lasts until late November

4. Piness, George: Study of Two Hundred and Two Cases of Hay Fever, J. A. M. A. **84**:584 (Feb. 21) 1925.

or early December, depending on the onset of the rainy season or the time when the first frost visits the lowland. June grass (Poa pratensis), velvet-grass (Holcus lanatus), Johnson grass (Andropogon halepensis), salt grass (Distichlis spicata), and the ragweeds (Franseria acanthicarpa) are some of the chief sources of pollens. Figures 11 to 14 indicate the most important pollens, together with their pollinating periods and the percentage of patients reacting to them.

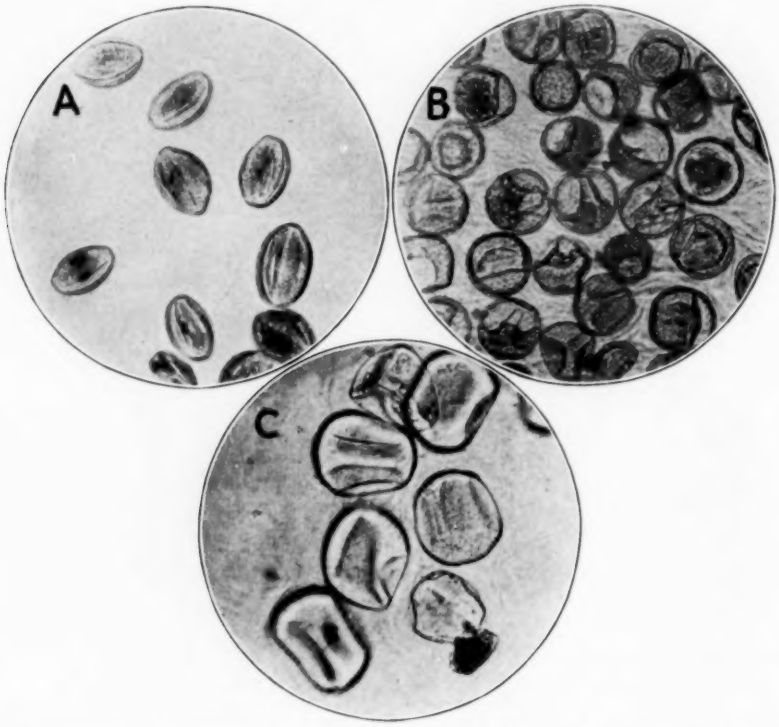

Fig. 14.—Los Angeles pollens: *A*, Artemisia tridentata (desert sage-brush), from August to October 15; 40 per cent of the patients reacted. *B*, Xanthium canadense (cocklebur), from May to October 25; 35 per cent of the patients reacted. *C*, Andropogon sorghum halepensis (Johnson grass), from May 25 to September 15; 37 per cent of the patients reacted. Magnification, × 350.

POLLEN COUNT OF THE AIR IN JAPAN

Through the courtesy of Prof. Dr. Ino Kubo, head of the department of otolaryngology of Kyushu Imperial University, one of his pupils, Dr. M. Sakakihara, sent a limited number of oil-smeared slides which had been exposed to the air in the city of Fukuoka according to the technic used in the United States. Dr. George Rue, an American medical missionary at Seoul, Korea, also sent a series of slides which

had been exposed to the air in the ancient capital of Chosen. By far the most systematic collection was obtained through Prof. Dr. H. Kasokabe, head of the department of otolaryngology of Hokkaido Imperial University. The collection was begun on April 15, 1932, and ended November 1, at which time frost began in Hokkaido. Six oil-coated slides were exposed every twenty-four hours; each was then covered with a clean slide, boxed and shipped to me. More than 1,200 have been carefully studied, the same technic being used in the enumeration. Figure 15 gives the concentration of pollen in the air in Sapporo during 1932. Pollination in Sapporo begins about April 20 and reaches its peak during June and July, the period of high concentration being interspersed with periods of low concentration when the atmosphere is purified by rain. As was previously noted (fig. 7), the average monthly number of rainy days is 12 or more during April, May, June, July and August, rapidly rising to 17 in September and October and to nearly 19 in November. The greatest precipitation occurs during August and

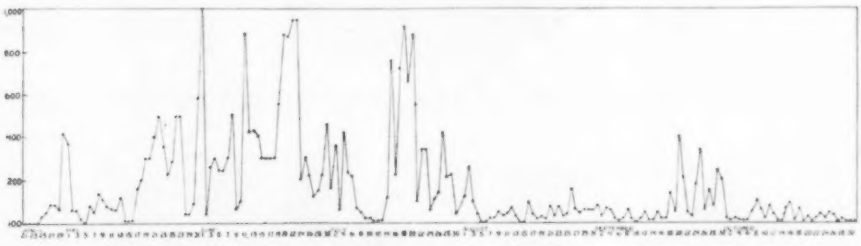

Fig. 15.—Pollen count for Sapporo, Japan, from April 21 to Oct. 30, 1932. The pollen count was carried out under the same conditions as described for figure 10.

the first half of September (fig. 7), and this explains the low level of the pollen count during those months. Figures 16 to 20 indicate the principal pollens found on the slides from Sapporo. It may be noted that the concentration of pollen in the air in Sapporo is about twice as great as that of Los Angeles. While the continued dry weather of the latter city favors easier dissemination of pollens, its lack of rain during the spring and summer appears to stunt the growth of vegetation, which is a determining factor in the pollen content of the air. The following corollary is equally true: The relatively large number of pollens in the air of Japan is unquestionably due to abundant rain, which increases the luxuriant growth of vegetation in that region. Sunny days are so interspersed between cloudy or rainy ones that they counterbalance the purifying influences of rain and so keep the air well loaded with pollens. The pollen-covered slides from Sapporo were submitted to several well known botanists on both sides of the Pacific Ocean. None was able to identify accurately the species present.

In the light of clinical experience, one is forced to conclude that the Japanese pollens are nonirritating. It has long been recognized that

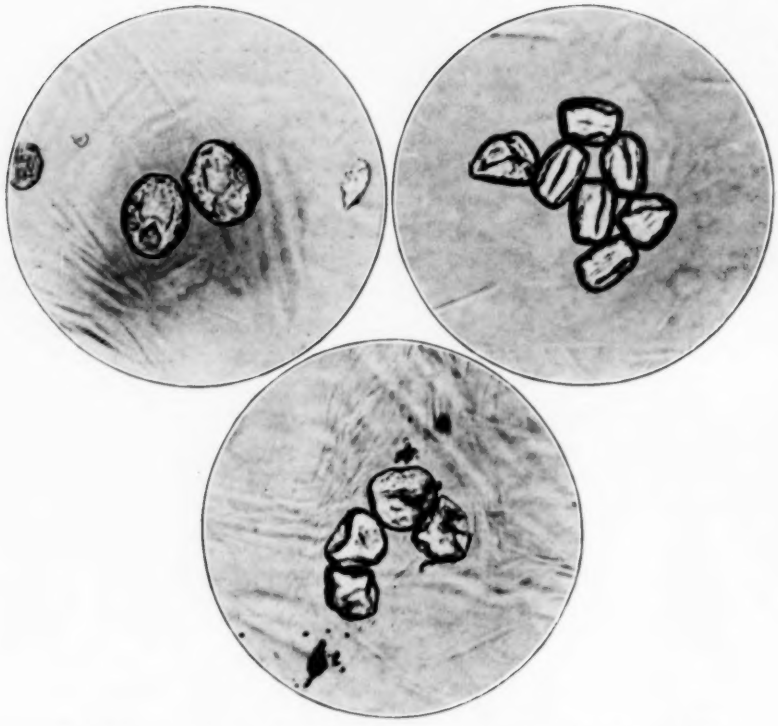

Fig. 16.—Japanese pollens, April and May; magnification, × 350.

Fig. 17.—Japanese pollens, June; magnification, × 350.

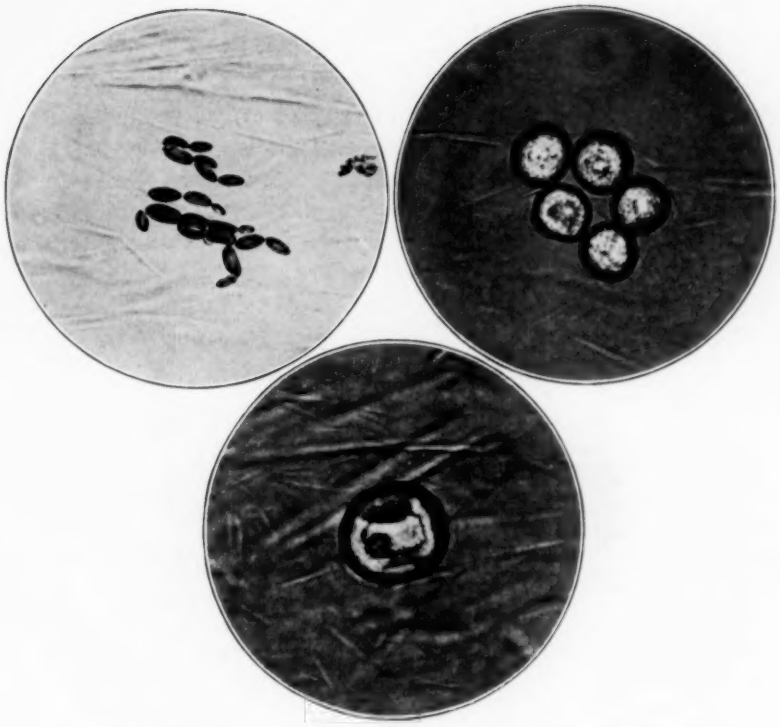

Fig. 18.—Japanese pollens, July; magnification, × 350.

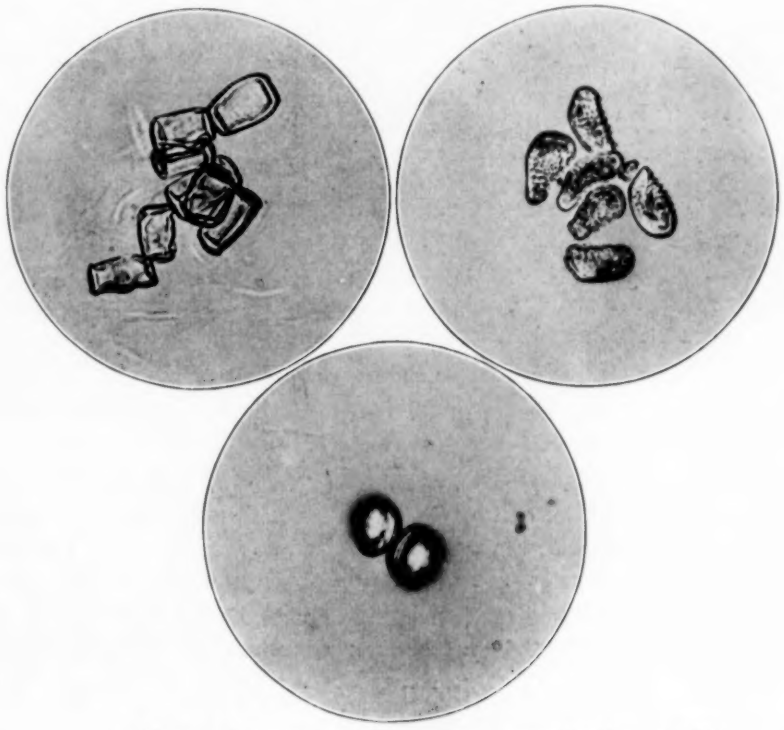

Fig. 19.—Japanese pollens, August; magnification, × 350.

pine pollen is universally present in extraordinarily large quantities and is extremely buoyant, yet it does not seem to cause hay fever. Pollens which are usually considered as exciting agents of hay fever in America were not found on the slides from Japan, or at least were found in insignificant numbers. Plants usually considered as excitants of hay fever in America are not totally lacking in Japan, but they appear to be negligible from an allergic standpoint. Herein lies the solution of the problem.

Fig. 20.—Japanese pollens, September and October; magnification, × 350.

CONCLUSIONS

1. The concentration of pollen in the air in Japan is much higher than that in Los Angeles.

2. Practically all Japanese pollens are large, heavy and nonspiculated.

3. The high humidity, abundant rain and other meteorologic conditions in Japan appear to prevent the dissemination of light, buoyant pollens, which are those usually considered as excitants of hay fever.

4. A low concentration of irritating pollens in the air is more productive of hay fever than is a higher concentration of nonirritating pollens.

432 South Boyle Avenue.

AURAL MANIFESTATIONS OF LIPOID GRANULOMATOSIS (XANTHOMATOSIS) OF THE SKULL

FRANCIS L. LEDERER, M.D.

HENRY G. PONCHER, M.D.

AND

NOAH D. FABRICANT, M.D.

CHICAGO

The development of tumors as a result of reaction to metabolic disturbances, chronic septic states or local changes in the tissues often presents a perplexing clinical and pathologic problem. Lederer, Fabricant and Milles [1] recently described an unusual cellular response to chronic infection. Another unusual type of cellular reaction, lipoid cell granuloma, prompts this report. Attention has been directed by a number of authors to the aural manifestations of this disease, but the American otologic literature is devoid of any reference to this entity. It is, therefore, not unreasonable to suppose that many cases have been overlooked.

CLASSIFICATION

The recent articles of Rowland [2] have done much to clarify the conception of the various clinical manifestations of disturbed lipoid metabolism. While the major interest has been in the Schüller-Christian syndrome, a number of less generalized forms of xanthomatosis have been described, which differ somewhat in several features.[3] Whether these forms should be classed with the primary idiopathic forms of xanthomatosus granulomatosis is still open to question. The present conception of xanthomatosis is that it is a reaction of the reticulo-endothelial cells to a disturbance in lipoid metabolism, although Gruenfeld and Seelig [4] cast some doubt as to the validity of this theory in explaining all forms of

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1. Lederer, F. L.; Fabricant, N. D., and Milles, G.: Plasma Cell Granuloma Secondary to Generalized Septicemia in a Case of Nasal Carcinoma, Arch. Otolaryng. **18**:316 (Sept.) 1933.

2. Rowland, R. S.: Xanthomatosis and the Reticulo-Endothelial System, Arch. Int. Med. **42**:610 (Nov.) 1928; Ann. Int. Med. **2**:1277, 1929.

3. Seyler: Ueber xanthomatische Granulome, Virchows Arch. f. path. Anat. **239**:20, 1922. Kirch, E.: Beitr. z. path. Anat. u. z. allg. Path. **70**:75, 1922; Klin. Wchnschr. **3**:1425, 1924. Wielberberg, M.: Xanthoma and Xanthoblastome, Virchows Arch. f. path. Anat. **253**:254, 1925.

4. Gruenfeld, G., and Seelig, M.: The Nature of So-Called Xanthoma, Arch. Path. **17**:546 (April) 1934.

xanthoma in a recent critical review on the nature of the disease. Pick,[5] in his discussion of the diseases of lipoid metabolism, divided xanthomatosis into two major groups: (1) the essential or primary forms, such as the Schüller-Christian syndrome, and (2) the symptomatic or secondary forms, such as xanthomatosis associated with diabetes mellitus. Localized xanthomas may be true neoplasms in which the accumulation in the tumor cells produces the xanthomatous appearance.

According to Jaffé,[6] except for malignant tumors that occasionally arise from the reticulo-endothelial cells of the blood-forming organs, the pathologic changes of the reticulo-endothelial system are reactive in nature. Jaffé brought out the point that in some cases the reaction may be so marked (systemic hyperplasia of reticulo-endothelial cells in the spleen, liver, lymph glands and bone marrow) as to resemble a primary disease. As an example he cited reticulo-endotheliosis which occurs as a peculiar reaction to sepsis. In the presence of disturbed lipoid metabolism there are also characteristic reactions of the reticulo-endothelial system. The variation in the clinical and pathologic picture would then be dependent on the nature of the predominating lipoid disturbed (in Niemann-Pick's disease, phosphatide; in Gaucher's disease, kerasin, a lipoprotein, and in the Schüller-Christian syndrome, cholesterol and its esters); the constitutional factor; the age of the patient, and the intensity and duration of the process. Endocrine, traumatic, infectious and other factors have also been assigned etiologic rôles in this process. Jaffé divided the pathologic types of reticulo-endothelial cell reaction in consequence of disturbed lipoid metabolism into two groups:

1. Primary, idiopathic generalized types
   - (*a*) Idiopathic xanthomatoses (the Schüller-Christian syndrome and the varieties affecting the skin, mucous membrane, tendons, aponeurosis and visceral organs)
   - (*b*) Niemann-Pick's disease
   - (*c*) Gaucher's disease
2. Secondary, symptomatic generalized types associated with
   - (*a*) Diabetic lipemia
   - (*b*) Chronic glomerulonephritis
   - (*c*) Disease of the liver with jaundice
   - (*d*) Pregnancy, etc.

He spoke further of the deposition of neutral fats and of doubly refractive lipoids in neoplastic growths (adenoma of the kidney, cystic adenoma of the ovary, carcinoma of the prostate), dermoid cysts, experimental oil tumors and chronic purulent inflammations (salpingitis

5. Pick, L.: Classification of Diseases of Lipoid Metabolism and Gaucher's Disease, Am. J. M. Sc. **185**:453 (April) 1933; Niemann-Pick's Disease and Other Forms of So-Called Xanthomatosis, ibid. **185**:601 (May) 1933.

6. Jaffé, R.: Personal communication to the authors.

and pyelonephritis) in which the absorption of fats or lipoids is the result of local changes in the tissues.

Such a broad conception offers a greater opportunity of explaining atypical examples of xanthomatosis and gives a comprehensive conception of the pathogenesis. This grouping also suggests that the numerous clinical and pathologic manifestations of xanthomatosis should be regarded not as diseases of the reticulo-endothelial system but as examples of varying reactions on the part of the reticulo-endothelial apparatus.

The function of phagocytosis in lipoid storage diseases is not always confined to the reticulo-endothelial cells (Niemann-Pick's disease and certain forms of primary xanthoma), but because these cells have a higher phagocytic function than any of the other mesenchymal tissue cells they are much more frequently involved when storage is demanded. As Jaffé stressed, the function of phagocytosis is a facultative property of all cells, possessed to the highest degree by the reticulo-endothelial tissues, and the difference is quantitative rather than qualitative.

PATHOLOGY

Xanthomatosis has heretofore been considered not a neoplastic process but a hyperplasia of the reticulo-endothelial cells in response to a need for phagocytosis of excess lipoid. The excess lipoid may be in the body fluids or may arise locally from disintegration of tissues. Rowland [2] has held to the view that the disturbance of lipoid metabolism is primary and the pathologic changes are secondary, and that the changes may be widespread, as in the Schüller-Christian syndrome, or circumscribed, in the form of granulomatous deposits, as in cutaneous xanthomas. Clinically, however, xanthomas may be conceived as lipoid storage tumors. The xanthoma cell is a reticulo-endothelial cell infiltrated by lipoid, and the xanthomatous lesion is a hyperplastic reaction of the reticulo-endothelial cells resulting from a demand to store excess lipoids. This reaction may be generalized or local. Cowie and Magee [7] recently did chemical determinations on tissue from a patient with primary generalized xanthomatosis and found that the lipoids in the tissues in this case differed in no way from those in the tissues of normal persons except where xanthomatous masses were located. At least from 40 to 50 per cent of the total lipoid was cholesterol. Examination of other large collections of reticulo-endothelial cells, such as those in the liver and spleen, gave normal values for lipoid, and pathologically these organs showed slight involvement. In another case, reported by Kleinmann,[8] in which the liver and spleen showed many xanthoma cells, the lipoid content was high.

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7. Cowie, D. M., and Magee, M.C.: Lipoids and Lipoid Diseases, Arch. Int. Med. **53**:391 (March) 1934.

8. Kleinmann, H.: Virchows Arch. f. path. Anat. **282**:613, 1931.

Pathologically, the xanthomatous masses are granuloma-like accumulations of pale round or ovoid cells from 20 to 40 microns or more in diameter, containing one or two pyknotic nuclei. The cytoplasm of such cells has an areolar network in which are contained the lipoid droplets composed of doubly refractive cholesterol fatty acid esters. Such

Fig. 1.—Photomicrograph (Dr. R. Jaffé) showing typical foam cells in the dura of a patient with the Schüller-Christian syndrome.

cells are spoken of as foam cells (fig. 1). These cells appear in the connective tissue at first. Later, leukocytes, lymphocytes and plasma cells are present, so that the involved tissue appears as granulation tissue. When such lesions become older there are proliferation and fibrosis of connective tissue. The foam cells degenerate and the lipoid becomes

free in the tissue. Cholesterol crystals and their clefts are formed, and a foreign body reaction, with the appearance of giant cells, results. Later, with increased fibroblastic proliferation, the tissue may have a cirrhotic appearance, with few foam cells and many eosinophil cells. Necrotic and hemorrhagic areas are sometimes encountered. Plewes,[9] in a recent publication, considered this phase of the subject in detail.

SYMPTOMATOLOGY

The clinical manifestations of xanthomatosis vary from the presence of a local tumor to generalized involvement with divers symptoms. Only a brief summary of the clinical aspects will be given here, as it is beyond the scope of this communication to go into all the phases of the disease. For more detailed information the reader is referred to the monographic treatises of Rowland [2] and Pick.[5] In general, however, it may be stated that the symptoms of xanthomatosis are referable to the degree of pathologic involvement. Thus, one may have skeletal lesions varying in distribution from localized tumors to involvement of any or all of the bones of the skull and, less commonly, of the long bones; cutaneous manifestations, which may vary from circumscribed and few lesions to extensive lesions; involvement of the tendons and aponeurosis; invasion of the hypothalamic region of the brain, producing endocrine syndromes of diabetes insipidus; Simmonds' syndrome; somatic disturbances and disturbances of sexual growth, and visceral manifestations. The triad of symptoms consisting in defects in the membranous bones, diabetes insipidus and exophthalmos is often referred to as the Schüller-Christian syndrome. The onset of the disease is insidious, usually occurring during childhood, and the course is one of chronicity. Fatalities are reported in one third of the cases. There is no well established racial or familial predisposition. In the cases with localized xanthomas such predisposing factors as trauma, irritation and inflammation are found intimately associated with the development of the tumor. In the generalized types, however, the distribution of the process seems to be too widespread to be accounted for by such factors, and a constitutional factor is presumed.

CLINICAL ASPECTS OF THE DISEASE OF INTEREST TO THE OTOLARYNGOLOGIST

The literature, especially that published within the past five years, contains numerous reports of cases of involvement of the upper respiratory tract and of the orbital manifestations of the disease. As early as fifteen years ago several clinicians described cases in which there were

9. Plewes, L. W.: Nature and Origin of the Xanthoma Cell, Arch. Path. **17**:177 (Feb.) 1934.

bony defects, and from then on many forms of xanthomatosis were reported. A number of years ago Urbach and Wiethe,[10] studying lipoidosis of the skin and of the mucous membranes of the mouth and larynx, made observations on nine patients belonging to four families.

Histologically (many biopsies were performed), all the superficial blood vessels of the skin and mucosa exhibited marked diffuse thickening of the walls, and there were enormous deposits of lipoid. In sections from older stages of the yellow nodules large homogeneous, partly round and more or less well outlined masses were seen, with few nuclei. In the small wartlike lesions the deposits were more diffuse and there was much overgrowth of blood vessels. The condition was similar to mucosal lesions.

On histochemical examination the deposits were found to consist of some lipoid which was physically combined with a protein. It was insoluble in alcohol, ether and chloroform, but was soluble in hot absolute alcohol and in boiling acetone. It became dark orange with sudan III. Whether these cases can be regarded as examples of xanthomatosis is open to question. The histochemical investigations make this seem unlikely. The cases with which we are mainly concerned in this report are the proved cases of xanthomatosis in which aural symptoms manifested themselves clinically. In reports of cases aural discharge or swellings about the ear in the course of xanthomatosis have been described merely as coincidental clinical findings or postmortem generalizations. In our perusal of the literature, therefore, we were concerned mainly with the aural expression of this entity.

Henschen [11] described aural disturbances in about half of the cases of xanthomatosis in which the membranous bones of the skull were involved, in groups 1, 2 and 3 of his clinical classification. Since xanthomatosis frequently attacks children and is frequently accompanied by disturbances of the teeth and of the ears, specialists in children's diseases and aural and dental surgeons may play a large part in bringing to light many cases which might not otherwise be diagnosed. Greifenstein [12] reported that the knowledge of the clinical picture of generalized xanthomatosis is important to the otorhinolaryngologist because a study of the literature shows that in twenty-six cases of the disease the ear was involved twelve times, the maxilla thirteen times and the nasal sinuses five times. Mettel [13] described a case of xanthomatosis in a boy

10. Urbach, E., and Wiethe, C.: Lipoidosis of the Skin and Mucous Membranes, Virchows Arch. f. path. Anat. **273**:285, 1929.

11. Henschen, F.: Acta pædiat. (supp. 6) **12**:1, 1931.

12. Greifenstein, A.: Involvement of Ear, Accessory Nasal Sinuses, and Maxilla in Generalized Xanthomatosis, Arch. f. Ohren-, Nasen- u. Kehlkopfh. **132**:357 (Sept.) 1932.

13. Mettel, H. B.: Xanthomatosis, Am. J. Dis. Child. **42**:858 (Oct.) 1931.

5 years of age in which the condition seemingly followed an injury to the head suffered in a fall. A swelling appeared immediately following the fall at the site of the trauma and remained. Four months following the trauma roentgen examination of this area showed a defect in the frontal bone 4 cm. in diameter. The child exhibited no symptoms, and all the laboratory examinations gave negative results. Although this lesion practically disappeared under radium therapy, numerous new defects appeared in various parts of the skull, involving the membranous bones exclusively. The long bones were not involved, and according to the last report the lesions were undergoing spontaneous remission. Jghenti [14] reported a case of Schüller-Christian syndrome in a 3 year old boy in whom autopsy showed extensive xanthomas eroding the base of the skull and similar deposits in the pelvis and the long bones. There was xanthomatous degeneration of the lymph nodes and of the liver, spleen and skin. Dunphy [15] described a 4 year old child who presented the following symptoms: thirst, frequent micturition, loss of weight, proptosis of the left eye, prominence of the occipital region and defective speech. An operation to remove the yellow tumor tissue was unsuccessful, and enucleation was performed. The child had left-sided exophthalmos, and discharge from both ears developed.

In some of these reports of cases the aural involvement received greater attention by the authors. In the recent reports of Lichty [16] and Wheeler [17] stress was laid on the aural findings. Lichty described a 21 month old girl whose illness had begun six months before with the spontaneous appearance of a tumescence on the inferior border of the right mandible. Three months after the onset the mandibular swelling disappeared, and coincidentally with its disappearance a small amount of foul-smelling yellowish material began to be discharged from the right ear. The discharge progressed, and mastoidectomy was performed on the right ear one month later. No pus was found at operation, but a small amount of yellowish granulation tissue was revealed. Eventually severe aplastic anemia developed, and the patient died. Lichty found that xanthomatous infiltration of the temporal bone may simulate mastoiditis, and in the case he cited mastoidectomy was probably ill-advised, in view of the fact that the patient already was on the down grade.

Wheeler [17] reported the case of a 3 year old child in whom the xanthomatous process invaded the orbit. Routine clinical examination showed, in addition, that both external auditory canals were full of soft, yellow flakes of thick, foul-smelling purulent discharge. When this was

14. Jghenti, W. K.: Zur Frage der allgemeinen granulomatösen Xanthomatose, Virchows Arch. f. path. Anat. **282**:585, 1931.

15. Dunphy, E. B.: Xanthomatosis, Am. J. Ophth. **14**:1048 (Oct.) 1931.

16. Lichty, D. E.: Lipoids and Lipoid Diseases, Arch. Int. Med. **53**:379 (March) 1934.

17. Wheeler, J. M.: Schüller-Christian Disease (Xanthomatosis), Arch. Ophth. **11**:214 (Jan.) 1934.

cleaned out, a pair of dull, corrugated, thick, unhealthy drums were revealed in which no landmarks were seen. Roentgenograms showed intact temporal ridges, but numerous areas of diminished density were

Fig. 2.—Photograph of the patient, showing swelling in the frontal and left zygomatic regions. The ear is displaced somewhat downward and forward.

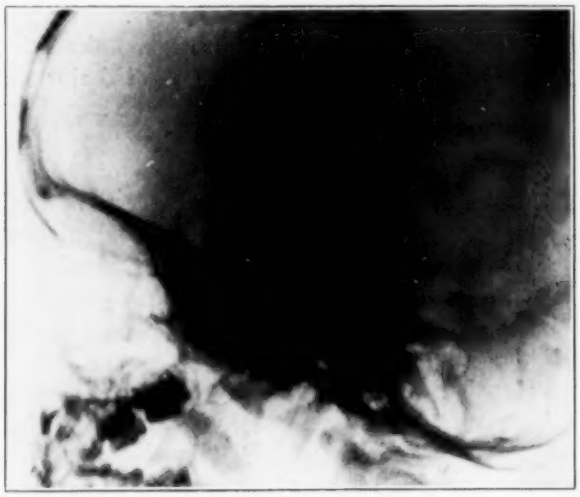

Fig. 3.—Roentgenogram taken on Jan. 27, 1933, showing areas of rarefaction in the frontal and left parietal bones.

present in the petrous portion of each temporal bone. At necropsy it was found that the petrous portions of both temporal bones and the right mastoid showed widespread xanthomatous masses. Similar pictures were found in sections from the right supra-orbital plate, the

parietal bone and both temporal bones. Between both auditory nerves and the bony walls of the internal auditory meatuses were layers of foam cells, though the nerves themselves were not infiltrated by them.

REPORT OF A CASE

On Jan. 25, 1933, H. J., a 2 year old white boy, was brought to the Research and Educational Hospital. A history elicited from the parents revealed that two months before a swelling had been detected on the left side of the face and a small, freely movable, marble-sized lump had appeared on the forehead. In the past the child had had occasional "colds" and two traumas of the head.

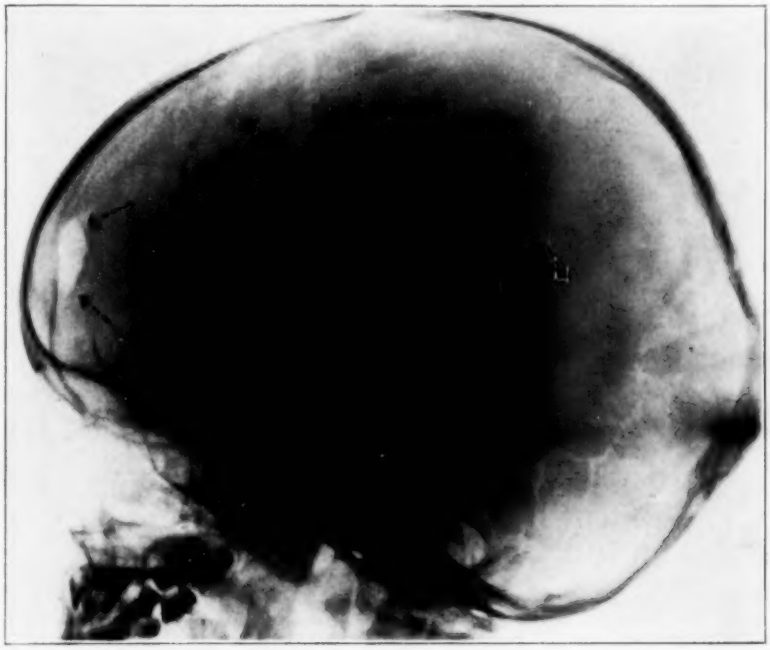

Fig. 4.—Roentgenogram taken March 20, 1933, showing areas of rarefaction in the frontal and left parietal bones.

The first of the traumas occurred when he was 1 year old. At that time he fell down a flight of seven stone stairs. He did not lose consciousness, nor did he apparently suffer any ill effects other than a mild discoloration and swelling of the forehead, which responded promptly to cold applications.

A roentgenogram taken by the family physician a number of weeks before the patient came to the Research and Educational Hospitals showed what was thought to be a bony cyst. Prior to admission the swellings were believed to have grown slowly more prominent.

Physical examination established a firm marble-sized, crater-shaped cutaneous lesion involving the frontal bone. No discoloration was present, nor was there any positive suggestion of tenderness. In the region of the left zygoma there was a diffuse swelling about the size of a small orange (fig. 2). On inspection no

sharply defined margin could be observed, but on palpation a definite, hard border was felt. The mass was not movable; it had a consistency similar to that of a hard rubber ball, and there was no discoloration. There was no tenderness or other evidence of inflammation. The left auricle was seen to be pushed outward and downward by the swelling. Webbing was found bilaterally between the second and third toes and the third and fourth toes. All other results of physical examina-

Fig. 5.—Photomicrograph (Dr. R. Jaffé) of a region of the bone, showing tissue made up in a large part of cells with pale granular cytoplasm and rounded or irregular pale nuclei, some of which display indistinct nucleoli.

tion were negative, except for a light brown nevus over the right scapula, containing fine hair.

The laboratory data were as follows: The Pirquet reaction was negative; urinalysis gave negative results; examination of the blood showed 4,500,000 erythrocytes, 15,700 leukocytes and 59 per cent hemoglobin, and a differential count

of 59 per cent polymorphonuclear leukocytes, 2 per cent large mononuclears, 35 per cent lymphocytes and 4 per cent eosinophils. The Wassermann and Kahn reactions were negative. Chemical examination of the blood showed 208 mg. of cholesterol per hundred cubic centimeters.

Repeated roentgenograms showed a localized rarefaction in the right side of the frontal bone and also a larger area of rarefaction in the left parietal bone (figs. 3 and 4).

Biopsy of the lesion in the frontal area was performed. Erosion was found to exist in the bone, and the mass removed resembled cyanotic or traumatized areolar tissue. The cortical portion of the bone was deficient, and the mass seemed

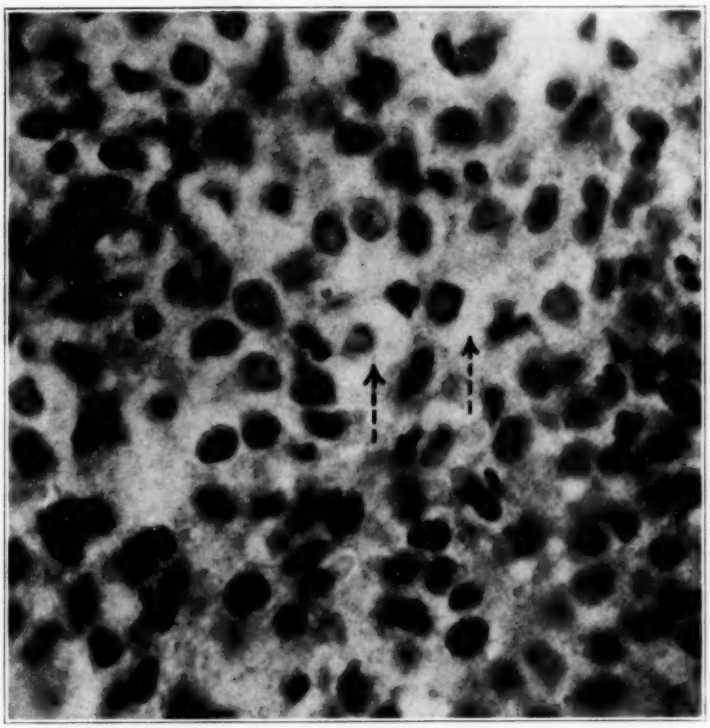

Fig. 6.—Photomicrograph of a biopsy specimen from the lesion in the frontal bone. The arrows point to the foam cells. The rest of the specimen appears as granulation tissue, showing the tendency to secondary changes and organization.

to arise from the medullary substance. Grossly, the tissue was not unlike that of the metastatic elements seen in some neoplastic diseases.

Microscopic examination revealed a reticulated structure, the tissue in a large part being made up of cells with pale granular cytoplasm and rounded or irregular pale, homogeneous nuclei, some of which displayed indistinct nucleoli (fig. 5). Many mitotic figures were present. The tissue was infiltrated by eosinophils and, to a much less extent, by neutrophils and was rich in small blood vessels. In one area there was a fragment of poorly developed bone. The microscopic diagnosis by Dr. Jaffé was lipoid cell granuloma xanthomatosis (fig. 6).

Roentgen therapy was instituted, and within two months the swelling in the left temporal region was noticeably reduced. Roentgen treatments were given with 140 peak kilovolts at a focal skin distance of 50 cm. through a 4 mm. aluminum filter. The general condition of the patient greatly improved; there was a gain in weight and strength, and there was increased appetite. A series of progressive roentgenograms taken during 1933 showed little change. In January 1934 a film taken of both mastoids showed questionable increased density over the left mastoid cells. The parietal bone showed two well marked areas of rarefaction, which undoubtedly represented a recurrence of the xanthomatosis in this region.

On Jan. 31, 1934, we removed for biopsy by means of curettage a mass filling the left external auditory canal which appeared as a fleshy granuloma, bleeding

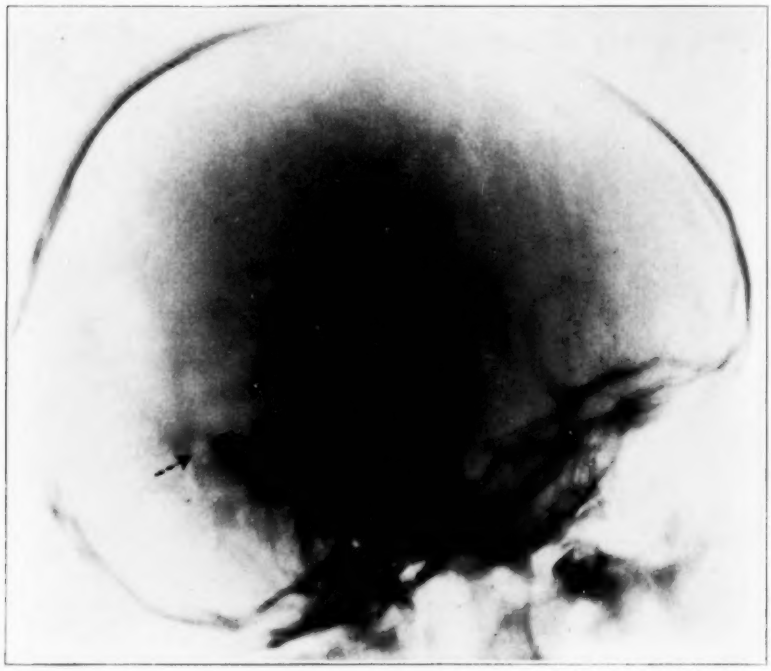

Fig. 7.—Roentgenogram with arrows pointing to the two localized areas of rarefaction in the parietal bone. The former areas of involvement in the parietal and frontal regions show the defects to be replaced by new bone (taken May 16, 1934).

readily and seeming to arise from the anterior wall of the canal. Microscopic examination proved conclusively the presence of an aural lipoid granuloma identical in cellular arrangement with the specimen removed for biopsy a year before (Jaffé).

The patient had no further clinical manifestations until May 1934, when slight prominences in the right parietal and occipital regions were noted. X-ray films taken at this time showed beginning xanthomatous involvement in these areas (fig. 7). Treatment with the roentgen rays was again begun, with involution of the recently involved areas. No new clinical manifestations have since been noted.

TREATMENT

In an excellent review on xanthomatosis Sosman [18] called attention to the value of roentgen treatment and to the fact that frequently no other treatment is available or is as effective. Roentgen treatments were given by Sosman with 185 kilovolts at a focal skin distance of 40 cm., through a 0.5 mm. rolled copper filter in a dose of 200 milliampere minutes. This was 85 per cent of the maximum suberythema dose and totaled 646 r (roentgens). Later this dose was decreased to 160 milliampere minutes (507 r), which did not cause epilation but resulted in healing of the defects, although not as promptly as the larger doses. Usually the total doses were divided into equal parts and given from two to seven days apart.

The dosage in our case was 150 kilovolts at a focal skin distance of 50 cm., through a 4 mm. aluminum filter. The areas responded excellently, and when recurrences were noted they likewise responded readily to the same form of therapy.

COMMENT

The localized appearance of xanthomatous infiltration about the bones of the skull and external auditory canal often brings a patient to the otolaryngologist, and it is important for him to bear this disease in mind. Such a local manifestation may be erroneously diagnosed as a simple polyp or granuloma arising from the middle ear in response to a suppurative process. Operative intervention may be thought of, particularly in view of a soft, almost fluctuant area which may occur in the parietal area, presenting a characteristic picture of a subperiosteal abscess. We have found that the literature mentions the great frequency (perhaps 50 per cent) of involvement of the ear in xanthomatosis of the skull.

It is of importance also to mention that the local appearance of such a tumor may simulate osteogenic sarcoma, giant cell sarcoma, lymphosarcoma, chloroma, leukosarcoma, atypical leukemia, multiple myeloma and sympathicoblastoma.

SUMMARY

It is apparent from a review of the literature and the study of our case that xanthomatosis may occur in various parts of the body and under a variety of clinical conditions. In this report the aural manifestations of the disease are especially noted to emphasize the relative frequency with which this region is involved.

The histogenesis of xanthoma cells is still obscure in some of its phases. The most generally accepted view regarding the nature of xanthomatosis is that it is a phagocytic reaction of the reticulo-endo-

18. Sosman, M. C.: Xanthomatosis (Schüller-Christian's Disease; Lipoid Histiocytosis), J. A. M. A. **98**:110 (Jan. 9) 1932.

thelial cells to the presence of lipoid material. The lipoid material may be in the nature of an increase in the normal amount or of a lipoid substance foreign to the body. The condition may be generalized, occurring with or without hypercholesteremia, or localized, associated with inflammatory, traumatic, neoplastic factors. Even in the generalized cases with hypercholesteremia some predisposing factor must be presumed, as there are other conditions with hypercholesteremia which are seldom, if ever, associated with xanthomatosis. Until one possesses a clearer etiologic understanding of the pathology of xanthomatosis, a comprehensive classification of the various forms is not possible. However, with increased early clinical recognition and careful observation of the conditions under which xanthomatosis occurs, important information will be obtained which may lead to a clearer definition of its pathogenesis in the future.

830 South Wood Street.

SO-CALLED MUCOID CYSTS OF THE NOSE

A REPORT OF THREE CASES

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NEW YORK

The complicated construction of the nose, with its folds, crests, grooves, sinuses and mucous coverings, and the manifold irritations from the outside predispose to the development of different tumors. Benign tumors, such as polyps, and malignant tumors, such as carcinomas and sarcomas, occur frequently. All these tumors are situated mostly in the nasal cavity or either in the sinuses or originating from them. Few are located at the apertura, and still more rare are cysts in this location; only about sixty have been reported up to the present time. The first case was reported by Zuckerkandl [1] in 1893.

The first microscopic examination of such a cyst was made by Brown-Kelly,[2] who was the first to look for an explanation of the origin of this cyst. No mention of these cysts is made in any of the textbooks in English, except by St. Clair Thompson.[3]

Within the past few months I have had occasion to observe three cases of this type, and the occurrence of these within a short period caused me to wonder whether the cysts are really rare. Are they not recognized, or are they perhaps observed more often by dental surgeons and classified as dentigerous cysts? In all these cases the condition was similar and conformed to the descriptions of previous authors so closely that there is no question that the cysts were of the same type.

REPORT OF CASES

CASE 1.—M. I., a 46 year old white woman, came to the clinic at the Harlem Eye and Ear Hospital complaining of a slight swelling of the left side of the nose, which she noticed was continually growing and which for the past few months had made breathing through the nose difficult on that side. She had noticed the swelling for the first time about two years before. No pain was present, and she came to the clinic because of the difficulty in breathing.

Examination revealed a stout, well developed woman. There was no significant family history. A slight swelling at the entrance of the left nostril could be

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From the Nose and Throat Department of the New York Post-Graduate Medical School and Hospital and the Harlem Eye and Ear Hospital.

1. Zuckerkandl, E.: Normale und pathologische Anatomie der Nasenhohle, Vienna, W. Braumüller, 1892-1893, p. 176.

2. Brown-Kelly: Internat. Centralbl. f. Laryng. **15**:168, 1899.

3. Thompson, St. Clair: Diseases of the Nose and Throat, London, Cassell & Co., Ltd., 1930, p. 222.

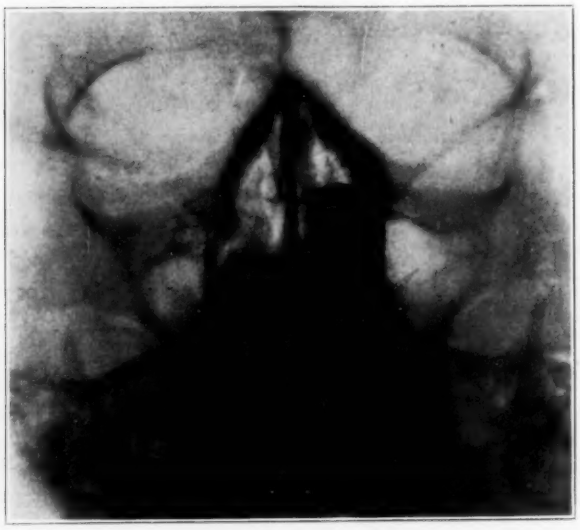

Fig. 1 (case 1).—Anteroposterior view of a cyst, which is filled with iodized poppy-seed oil 40 per cent.

Fig. 2 (case 1).—Lateral view of the cyst shown in figure 1.

Fig. 3 (case 1).—Section of the cyst, showing microscopic structure similar to that of the mucous membrane of the turbinates or sinuses.

noticed. The nasolabial groove had disappeared, and a swelling could also be observed under the inferior turbinate, which extended to the floor at the entrance of the nose. There were no inflammatory changes in any part of the nose. The cavity of the nose proved to be normal. The septum was straight, and there was no congestion or hypertrophy of the inferior turbinate. There was no bulging of the upper lip, but on palpation with the finger under the upper lip and counter-pressure on the nasal floor fluctuations could be felt. No discharge or fistula could be seen. The tumor was slightly movable above the maxilla and did not cause any pain on pressure. The teeth were in good condition. The Wassermann reaction was negative. The urine and blood count were normal.

A diagnosis of nasal cyst was made. After I had removed about 5 cc. of thick, honey-like, transparent fluid, an injection of iodized poppy-seed oil 40 per cent was made, and a roentgenogram was taken immediately. This showed a round, circumscript shadow the size of a walnut, located partly in the nasal cavity near the nasal floor (figs. 1 and 2). There was no connection with the floor of the nose, the wall of the sinus or any of the teeth. The cyst was located on the alveolar process at the apertura pyriformis of the maxilla. I made an appointment with the patient for removal of the tumor, but the next day the left side of the face became markedly swollen, and the floor of the nose became red and very painful. This condition was caused, no doubt, by irritation by the poppy-seed oil. The following day the tumor broke into the nose, and all the oil was discharged.

Two days later the pain and the inflammatory reaction had disappeared. The cyst was removed intact through an incision made under the upper lip, with the patient under local anesthesia. There was no difficulty in separating it from the floor, but I had some difficulty with adhesions on the nasal floor at the fistula which formed where the cyst broke. No impression could be observed on the maxilla, such as has been reported by many observers in similar cases. The incision was closed with catgut and healed with primary union. The mucous membrane of the nasal floor was also sutured, and within four or five days the wound was completely healed.

Microscopic examination of the cyst (Dr. Knox) showed (fig. 3): The cyst was made up of a lining consisting of tall columnar epithelium such as that seen throughout the large part of the nasal cavity, especially about the mouth of the maxillary sinus. No cilia could be seen, but the epithelium was unquestionably of the type which is ciliated when in a perfectly preserved condition. There were no goblet cells; in fact, there was little evidence of the production of mucus. The cells were arranged in a regular manner, with a crowded layer of basal nuclei and a secondary layer in the outer half of the cell. There were a few areas of atrophy, and there was also extreme hyperplasia, with still more heaping up of the cells. These were separated by a rather thin membrane containing many small connective tissue nuclei and showing mucoid degeneration. There was comparatively little infiltration, and that present consisted largely of lymphocytes. Examination of the contents for cholesterol gave negative results.

CASE 2.—T. H., a 25 year old colored woman came to the clinic of the Harlem Eye and Ear Hospital in the latter part of August 1931, because of marked swelling above the upper lip and in the nose, mostly to the left side. Occasionally there were severe pain in the maxillary region and difficulty in breathing.

Examination showed a tumor the size of a hen's egg above the maxilla on the nasal floor extending to the right side. Distinct fluctuation could be felt, but no inflammatory changes could be seen. Fifteen cubic centimeters of honey-like transparent liquid was withdrawn.

This patient did not return to the clinic, but was accidentally seen by me again on December 30, when she came to the clinic of the New York Post-Graduate Medical School and Hospital. After the withdrawal of the liquid she had been entirely relieved, but lately her pains were returning and the swelling was growing larger. For this reason she had returned for further treatment. The tumor was found to be much smaller than when seen for the first time, although the fluctuation could still be felt. She was advised to have the tumor removed, and was admitted to the hospital on Jan. 4, 1932.

Examination showed a slender woman with no pathologic condition except in the nasal area, where a picture similar to that in case 1 could be seen. The teeth were in excellent condition. The Wassermann reaction was negative. The blood count and urine were normal.

About 10 cc. of honey-like, slightly turbid liquid was withdrawn, and contrast filling with iodized poppy-seed oil was made. Examination of the fluid showed a marked amount of amorphous matter, few cells and no bacteria. Cultures were negative. The cholesterol content was 187 mg. per hundred cubic centimeters. Microscopically, several pure form cholesterol crystals could be seen in every field, with occasional clumps.

A preliminary roentgen examination showed veiling of the right antrum, as well as of the right ethmoid sinus, suggesting light membranous infiltration. Examination after the injection of a contrast medium showed a circumscribed cyst in the upper lip. There also appeared to be some pressure atrophy of the superior maxilla at the posterior margin of the cystic tumor. The diagnosis was: membranous infiltration of the right antrum and right ethmoid sinus, cystic tumor of the upper lip and possible secondary atrophy of the superior maxilla (figs. 4 and 5).

The tumor was removed under local anesthesia. It was located toward the right, with a pedicle going high up to the nasal process of the maxilla, which was easily separated. There was marked atrophy of the maxillary bone on the left side. No similar changes could be observed on the right side of the maxilla. There was no attachment of the cyst to any part of the bone, periosteum or teeth. The incision was closed with catgut and healed with primary union.

Examination (Dr. Meeker) showed: Grossly, the specimen was a membranous sac that had been opened and the contents of which had been lost. The collapsed sac measured 25 by 17 by 4 mm. The inner surface was fairly smooth and presented hemorrhagic thickened areas. Microscopically, the sac was lined for the most part with pseudostratified columnar epithelium which in some areas was ciliated. At many points the lining epithelium was changed to a low cuboid cell type, apparently owing to pressure. The supporting stroma was edematous fibrous tissue with many areas of extravasated blood. The deeper layers of the wall were more densely fibrous, and about the blood vessels in this deeper portion there was mild infiltration by lymphocytes. Several very thin bony plates were embedded in the wall. At one point the wall showed large projecting folds resembling polyp formation. One of these was covered with a large ulcerating area beneath which there was granulation tissue. The stroma in these folds generally was fairly dense fibrous tissue heavily infiltrated by lymphocytes and plasma cells. There was a central opening in the larger pseudopolyp, which was lined with stratified squamous epithelium. This epithelium was irregularly thickened and sent prolongations into the deeper parts; it was, however, sharply demarcated from the supporting stroma. The squamous epithelium was edematous and heavily infiltrated by polymorphonuclear leukocytes. One of the squamous epithelial prolongations communicated with the cavity of the sac, and at this point there was transition from

Fig. 4 (case 2).—Anteroposterior view of a cyst, which is filled with iodized poppy-seed oil.

Fig. 5 (case 2).—Lateral view of the cyst shown in figure 4.

squamous epithelium to the pseudostratified columnar epithelium lining the sac. The diagnosis was cyst of congenital origin.

CASE 3.—I. J., a 35 year old white man, came to the clinic of the Harlem Eye and Ear Hospital on March 28, 1933, because of swelling on the outer right side of the nose. The family history was not obtained. There had been nothing significant in the patient's childhood, and there was no history of syphilis, tuberculosis or cancer. As regards his illness, he gave the following history: During the winter of 1921 he had noticed a slight swelling on the right side of the nose externally at the nasolabial fold. There was no pain or redness; the swelling felt solid and was slightly movable. About ten months later, while the patient was in Panama, the swelling disappeared. It reappeared in the winter of 1929, after a cold in the head, and had gradually increased in size. During the two months preceding examination its growth had advanced more rapidly, and there had been some tenderness on pressure, but no redness or pain.

Physical examination showed a well developed and well nourished man of average weight. Except for the condition of the nose, there were no pathologic changes. Examination of the nose showed a moderate swelling on the floor of the nose under the inferior turbinate. This swelling was palpable under the upper lip on the right side, and on counterpressure distinct fluctuation could be felt. The nasolabial fold had disappeared on that side, owing to the swelling. The overlying skin appeared normal; the size of the tumor, which appeared to be a cyst, was about that of a Brazil-nut. No other pathologic changes could be found in the nose. The teeth were in fair condition; a roentgenogram showed an apical abscess at the medial incisor; there was an apical infection at the lateral incisor; the canine teeth and the first and second bicuspids appeared to be normal. The tonsils were small and buried. Roentgenograms of the skull and sinuses did not show any pathologic changes. The diagnosis was mucoid cyst of the nose (?). The patient was advised to enter the hospital for the removal of the cyst. He was admitted to the hospital on April 6, and the cyst was removed under local anesthesia through an incision in the upper gingiva. There were marked adhesions to the floor of the nose, but the cyst could easily be separated from the upper maxilla, where pressure atrophy was noticeable. The origin appeared to be directly below the inferior orbital bone or the zygoma. The cyst contained a yellowish-brownish honey-like liquid with occasional light yellow tinges. There were no hair or teeth in it. The wound was closed with catgut and healed with primary union. The patient left the hospital two days after the operation in good condition.

Examination (Dr. Knox) showed: Grossly, the cyst measured 2.5 cm. in length and was collapsed, owing to pressure from instruments, but presented a small opening 0.5 cm. in diameter at one end and, when distended, formed an ovoid cyst with an intact membrane. The lining of the cavity consisted of columnar epithelium only. It was of somewhat variable thickness, and usually there was more than one layer of cells, some of which produced mucus. It was not ciliated, or at least cilia could not be demonstrated in this preparation. There was a small fragment of bone in one side close under the epithelial lining, but the rest of the supporting tissue was fibrous only. Masses of mucus-producing glands were present outside the fibrous wall, and on the outer surface of this there was a small cavity lined with squamous or modified squamous epithelium. This had no connection with the main lumen. There was a slight papillary arrangement in some portions of the lining. The cyst was not a dermoid, but its lining was undoubtedly of the same type as the epithelium found near the turbinates and a considerable portion of the lining of some of the sinuses. There was no evidence of epithelial overgrowth or of malignancy.

The contents consisted of fluid which contained a large amount of cholesterol—100 mg. per hundred cubic centimeters of fluid. This growth had the appearance of a cyst of the lacrimal duct.

COMMENT

In view of the physical findings and the report of the microscopic examination, these three cysts are shown to be similar to those reported by previous authors. The simplicity of these cases does not warrant discussion except as concerns the origin of such cysts and why they are invariably located in a similar place. They are usually unilateral, although Kofler [4] reported two cases in which they were bilateral.

Many theories have been offered as to their origin, but none is conclusive enough to be accepted as final. Zuckerkandl [1] was the first to mention that he noticed a solitary walnut-sized cyst at the entrance of the nose, with no polyps in the neighborhood, which contained a honey-like, transparent liquid. He made no mention of the origin. Other early authors, among them McBride,[5] Dunn,[6] Chatellier [7] and Knapp,[8] collected about eight instances, and they were all of the opinion that the growths were retention cysts, developing from the mucous glands of the nasal floor. Brown-Kelly [2] was the first to call attention to the fact that these cysts develop in the fissure where the maxilla and the nasal bone are grown together, and among the three cases reported by him one cyst was removed and examined microscopically. He also thought that they were retention cysts which had developed from the ducts of the mucous glands of the nasal floor; on examination he found the floor swollen and some of the ducts dilated. He thought that some inflammatory process was an underlying cause of this development.

The same opinion was expressed by Wingrave,[9] although he mentioned the possibility of development from the Stenson duct or from the Scarpa foramen. Of recent authors, Kofler, who observed more than seven cases, was inclined to diagnose the structures as retention cysts. Roth [10] and Hellat [11] were of a similar opinion.

The objections against this theory are: Why do these cysts always develop in the same part of the nose when the whole mucous membrane of the nose is full of mucous glands? These retention cysts are usually covered with one layer of columnar epithelium, but this is never ciliated.

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4. Kofler, K.: Monatschr. f. Ohrenh. **53**:388, 1919.
5. McBride, P.: Cysts of the Tonsils Nose, Larynx and Ear, Brit. M. J. **2**:56, 1894.
6. Dunn, J.: Case of Cystic Tumor of the Floor of the Nose, New York M. J. **59**:238, 1894.
7. Chatellier, H.: Internat. Centralbl. f. Laryng. **10**:10, 1893.
8. Knapp, H.: Ztschr. f. Ohrenh. **26**:154, 1894.
9. Wingrave, W.: Internat. Centralbl. f. Laryng. **15**:168, 1899.
10. Roth: Monatschr. f. Ohrenh. **50**:406, 1916.
11. Hellat: Internat. Centralbl. f. Laryng. **23**:262, 1907.

Beck [12] was of the opinion that these cysts are misplaced embryonic cells, like cysts which can be found in other parts of the body. Blumenthal [13] had the same idea, only he thought of the faulty development of the nasomaxillary region. The same theory was accepted by Klestadt,[14] who claimed that all these cysts develop in the oblique craniofacial fissure in the place near where the medial nasal process, the lateral nasal process and the upper jaw meet. In his case, that of a 9 month old infant, a small cyst was located at the inner canthus of the eye. No clefts could be found in this connection, however; there were only depressions, which disappeared when the parts had grown together. There is, however, a possibility that the cysts may develop from remnants of the ectoderm. This theory was accepted by many authors, such as Vogel,[15] Huizinga,[16] Uffenorde [17] and Doring.[18]

At this point another question can be raised: Why are dermoid cysts, which are of ectodermic origin, frequent in the upper part of the craniofacial fissure near the eye and never found lower, while the majority of these cysts are located at the entrance of the nose?

Brüggemann [19] had an entirely different explanation to offer. He was of the opinion that these cysts are nothing else but remnants of a misplaced opening of the nasolacrimal duct. He based his opinion on the results of the examinations by Monesi,[20] Peter [21] and Tüffers,[22] who made a special study of the development of the nasal structure and the lacrimal duct in animals, especially mammals. Peter showed that in mammals the nasal opening of the lacrimal duct is much farther forward than in other animals. Sometimes he found two openings, one in the front and one much farther back under the inferior turbinate. Sometimes only the posterior opening could be found, and a small crooked duct could be observed instead of the anterior opening. He did not have any explanation to offer for this, but Bochdalek [23] and Monesi

12. Beck, O.: Arch. f. Ohrenh.- Nasen- u. Kehlkopfh. **85**:34, 1911.
13. Blumenthal, A.: Deutsche med. Wchnschr. **36**:801, 1910.
14. Klestadt, W.: Ztschr. f. Ohrenh. **81**:330, 1921; Ztschr. f. Hals-, Nasen- u. Ohrenh. **15**:471, 1926.
15. Vogel, K.: Ztschr. f. Hals-, Nasen- u. Ohrenh. **5**:433, 1923.
16. Huizinga, E.: Folia otolaryng. **8**:505, 1925-1926.
17. Uffenorde, W.: Arch. f. Ohrenh-, Nasen- u. Kehlkopfh. **107**:263, 1921.
18. Doring: Arch. f. Ohrenh.-, Nasen- u. Kehlkopfh. **117**:138, 1927-1929.
19. Brüggemann, A.: Arch. f. Laryng. u. Rhin. **33**:103, 1920.
20. Monesi: Klin. Monatsbl. f. Augenh. **42**:1, 1904.
21. Peter, K.: Atlas der Entwicklungsgeschichte der Nase und des Gaumens beim Menschen mit Einschluss der Entwicklungsstörungen, Jena, Gustav Fischer, 1913.
22. Tüffers, P.: Die Entwickelung des nasalen Endes des Tränennasenganges bei einigen Säugetieren, Wiesbaden, J. F. Bergmann, 1913.
23. Bochdalek: Beitrag zur Anatomie der Thränenorgane, Vrtljschr. f. d. prakt. Heilk. **90**:121, 1866.

found a similar condition in man and saw cases in which a small groove covered with a fold of mucous membrane and a secondary opening besides the regular opening of the lacrimal duct were present. Schaeffer [24] mentioned double or even triple openings of the nasolacrimal duct and observed cases in his embryologic study in which there were small branched, tubular glands originating from the lacrimal duct, especially when the duct was near the nasal opening. Brüggemann took the commonly observed histologic picture as the explanation of the development of these cysts from the nasolacrimal duct. This contention was denied by Klestadt and his followers.

Malan [25] and Grünwald [26] traced the origin of this cyst to the nasopalatine duct, which theory was strengthened by the results of Schaeffer's [24] examinations. Schaeffer stated:

> The naso-palatine canals are remnants of the wide connection between the nasal and oral cavities found in the early period of fetal life. In a vast majority of the instances, the lumina of the canal are obliterated and represented by impervious cords of epithelial cells continuous with epithelium of the roof of the mouth at one extremity and with a funnel shaped ciliated epithelial lined depression in the floor of the nasal fossa at the other. Indeed at times it is difficult to find any epithelial remnant of the canals whatsoever. The obliteration of the lumina often begins before birth. The persistence of the lumina of a portion of the naso-palatine canal may be the explanation for cells in the maxillae dorsal to the upper incisor teeth. Indeed, such a cell could communicate either with the inferior meatus or the buccal cavity; or in the event that both extremities of the canals become impervious, the central portion would be without a drainage channel and could readily become cystic.

He cited a case described by Meyer [27] as one of a unique supernumerary paranasal sinus directly above the superior incisors. The size of the cyst was 16 by 13.5 by 22 mm. He thought that the cyst in Meyer's case was a freakish accessory nasal sinus which had developed from the inferior nasal meatus. He cited the case as unique, but he himself later observed a specimen in which a good-sized epithelium-lined cavity existed in the line of the original nasopalatine canal. It was a blind cavity and connected with neither the buccal cavity nor the nasal fossa. In his opinion, it was a remnant of a persisting portion of the embryonic nasopalatine canal. From his description, one can safely presume that both these cysts were similar.

None of the previous theories as to the origin of these cysts is conclusive enough to enable one to formulate a definite deduction. All of them exclude the possibility that these cysts are dermoids, because none

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24. Schaeffer, J. P.: The Nose, Paranasal Sinuses, Nasolacrimal Passageways, and Olfactory Organs in Man, Philadelphia, P. Blakiston's Son & Co., 1920, p. 121.
25. Malan, A.: Centralbl. f. Hals-, Nasen- u. Ohrenh. **7**:156, 1925.
26. Grünwald, L.: Ztschr. f. Ohrenh. **60**:316, 1910.
27. Meyer: J. Anat. & Physiol. **48**:412, 1914.

of the so-called mucoid cysts contain any hair, teeth or other horny substances, as is characteristic of dermoids, and in addition, the microscopic structure is different. The majority of authors deny the possibility of a dental origin of these cysts because of their microscopic structure. The dentigerous cysts (radicular or follicular) are lined with multilayered pavement epithelium, contrary to the mucoid cysts, which are lined with columnar or ciliated columnar epithelium.

This is probably true of the majority of cases, but Rohmer [28] conclusively proved that some cysts of dental origin have a microscopic picture similar to that of the so-called mucoid cysts, and he showed the transformation of a dental epitheliogranuloma of the upper maxilla into a cyst in which the cavity was lined with multilayered pavement epithelium on one side and with ciliated columnar epithelium on the other. He observed in this preparation granulations covered with ciliated epithelium directly extending into the maxillary antrum.

Adloff [29] made a similar observation in two cases.

Blum [30] reported two cases similar to those reported by me, in which he also observed the lining to be ciliated columnar epithelium. He thought that these cysts are related to the nasal mucous membrane, although he claimed that all cysts in the upper jaw originate from the dental system, and he expressed the belief that in one of his cases the displacement of the nasal epithelium into the maxilla was due to a trauma. He did not mention, however, whether or not either of these cysts had any cholesterol content.

The theory that dentigerous cysts develop either from the epithelial sheet of Hertwig (*débris épithélial de Malazzes*) or from misplaced enamel germs, which may be mixed with mislocated embryologic sinus epithelium germs, is accepted by the majority of dental research workers (Partsch,[31] Witzel,[32] Magitot [33] and Malazzes [34]). Malazzes observed remnants of the normal maxillary epithelium in the periodontium, where they lie all over in the connective tissue, reaching to the apex. He called these cells "paradental." He noted a resemblance to the numerous epithelial buds which during fetal life develop from the enamel and from the bands of connective tissue which join the enamel with the epithelium of the mouth; he claimed, with Rohmer concurring, that all cystic growths

28. Rohmer, in Henke, F., and Lubarsch, O.: Handbuch der speziellen pathologischen Anatomie und Histologie, Berlin, Julius Springer, 1927, vol. 42, p. 330.

29. Adloff, P.: Deutsche Zahnarzt. Wchnschr. **28**:134, 1910.

30. Blum, T.: J. Am. Dent. A. **16**:647, 1929.

31. Partsch: Handbuch der Zahnheilkunde, Munich, J. F. Bergmann, 1924, p. 212; Ueber Zysten der Gesichtsskelett, Verhandl. d. Gesellsch. deutsch. Naturf. u. Aerzte, Breslau, 1904, p. 144.

32. Witzel, J.: Deutsch Monatschr. f. Zahnh. **14**:305, 1896.

33. Magitot, E.: Gaz. hebd. de méd., Paris **21**:338, 1876.

34. Malazzes, L.: Deutsche Monatschr. f. Zahnh. **7**:214, 1887.

of epithelial character which are located around the alveolar process and even in the whole maxillary region are nothing else but dentigerous cysts of probably follicular type and develop from the paradental epithelial cells. Rohmer mentioned observation of these cysts in the canine fossa, the hard palate, the nasal floor near the vomer and the lateral wall of the nose and around the inferior orbit.

SUMMARY

1. In all cases reported previously the cyst was located in a similar place, and the contents were clinically the same, except when the cyst became infected and broke down.

2. The microscopic structure was usually columnar ciliated epithelium, but there were cases in which the multilayered pavement epithelium formed the covering. There were also cases in which transformation of the pavement epithelium to columnar or ciliated columnar epithelium could be seen.

3. In the majority of cases the cyst did not contain cholesterol, but there were cases in which there was a cholesterol content. However, the cholesterol content of the cyst cannot serve as a basis for differential diagnosis, because there are many dentigerous cysts which do not contain cholesterol (Darlington [35]).

4. As for the origin of these cysts, in my opinion Rohmer's theory that they are of embryologic origin and develop either from the epithelial sheet of Hertwig or from misplaced enamel germs mixed with mislocated embryologic sinus epithelium germs, in the cranio-ethmoidal fissure, mostly where the lateral process of the superior maxilla meets the nasal process, should be accepted, and they should be classified as cysts of dental origin. Whether or not a trauma or any other external interference, such as infection or inflammation, is the causative factor in the development of these cysts cannot be verified.

5. The rarity of these cases is only relative, because they are seen mostly by dental surgeons and not by rhinologists.

6. The fact which the German authors stress—that these cysts are found mostly in females—I believe to be based on purely accidental findings.

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35. Darlington: Personal communications to the author.

THE STRUCTURE OF THE SECONDARY NODULE OF THE TONSIL

A PRELIMINARY REPORT

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The secondary nodules of the tonsil, otherwise called germinal centers, are usually arranged in a single layer under the epithelium. The term "germinal center" is a good one if it is granted as proved that the production of new lymphocytes occurs within these structures. I am not concerned here with that problem, however, and for that reason shall use the less committal term "secondary nodule."

The capsule of the tonsil and the fine projections of connective tissue which dip down from the capsule are made up of irregularly arranged collagenous fibers. The remainder of the supporting structure of the tonsil consists of a meshwork of reticular fibers in association with a syncytium of reticular cells. The purpose of this report is to describe findings relative to the arrangement of these reticular fibers in the immediate vicinity of the nodules, at their periphery and within their substance.

The material used consisted of one relatively normal tonsil and other tonsils which from a clinical and histopathologic standpoint were diseased. The following preparations were made:

METHODS

1. Mall's pancreatin digestion method
2. Frozen sections at 20 microns prepared by Bielschowsky's silver impregnation method
3. Pyroxylin (celloidin) sections at 15 microns prepared by the Perdrau modification of the Bielschowsky silver impregnation method
4. Paraffin sections at 12 microns prepared by Foote's silver carbonate method

With the exception of the Mall technic the methods carried out were those given by McClung [1] in his "Microscopical Technic." The sections cut serially in pyroxylin (celloidin) proved to be the most satisfactory, and the drawings illustrating this report were made from such a preparation. The drawings were made by the projection method inasmuch as it was felt that greater accuracy could be obtained line for line than by the use of the camera lucida.

Read before the Section on Laryngology, Otology and Rhinology at the Eighty-Fifth Annual Meeting of the American Medical Association, Cleveland, June 13, 1934.

1. McClung, C. E.: Handbook of Microscopical Technic for Both Animal and Plant Tissues, New York, Paul B. Hoeber, Inc., 1929.

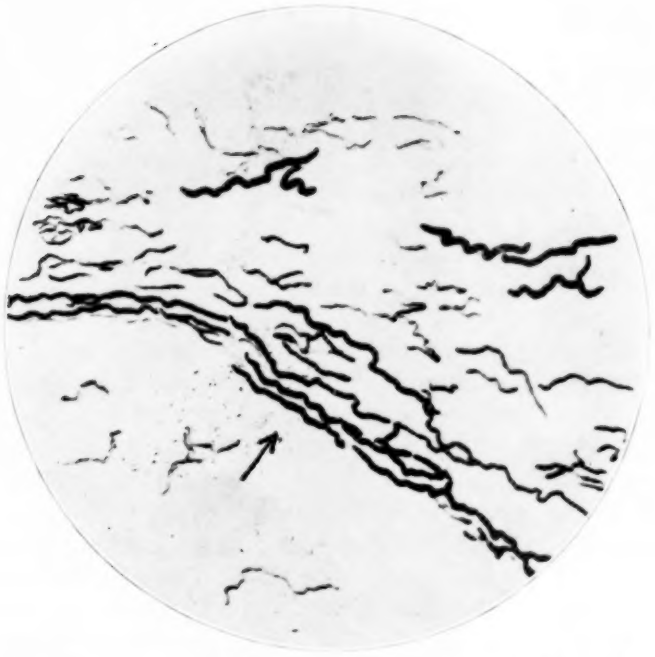

Fig. 1.—The arrow is within the nodule. Note the parallel arrangement at the periphery.

Fig. 2.—The arrow is within the nodule. Note the thick fibers arranged roughly parallel.

It was found that whereas the reticular fibers branch, anastomose and ramify with no regularity of pattern throughout the tonsil with the exception of those areas in the immediate vicinity of the secondary nodule, here they assume a pattern which is constant and regular (figs. 1 and 2). The fibers are fairly thick and are arranged more or less parallel to one another in two or three rows. In sections stained with hematoxylin and eosin it is readily seen that the small, dark-staining lymphocytes which are packed in sharply parallel rows at the periphery of the nodule correspond in their arrangement to the concentric and parallel arrangement of the supporting fibers in this part.

Fig. 3.—The arrow is within the nodule, pointing to the pole of the nodule showing dispersion of fibers.

This arrangement, however, does not obtain around the entire periphery in some of the nodules, as seen in any one section. Some of them show at one pole a dispersion of the fibers (fig. 3). It is at this point that one frequently observes minute blood vessels in cross-section just outside of the nodule. In one section a small vessel cut tangentially was seen to be entering the interior of the nodule. These vessels are difficult to demonstrate except by silver impregnation.

The arrangment of the reticular framework within the nodule differs from that of the rest of the tonsil in that the fibers do not seem to interlace as much as they do elsewhere. Moreover, the fibers are

extremely thin and even in serial sections are extremely difficult to trace for any distance (fig. 4). The arrangement is far looser, and there are wide spaces which in counterstained preparations are seen to be packed with various cells.

The cellular content of the nodule as shown by differential staining consists of lymphocytes of various size and maturity. There are many reticular cells, the nuclei of which alone stand out definitely, as the cytoplasm has no limiting cell boundary but forms part of a true syncytium. Mast cells and an occasional plasma cell are found.

Fig. 4.—The arrows are within the nodule, pointing to thin, short fibers.

INTERPRETATION

It has been believed that the secondary nodule of the tonsil is an ovoid structure surrounded everywhere by a network of reticular fibers which form a more or less closed structure. Moreover, it has been believed that the newly formed lymphocytes probably develop (Maximow-Bloom [2]) from the reticular cell syncytium, and from undifferentiated mesenchymal cells within the secondary nodule. These may find their way out of the nodule here and there through the interstices

2. Maximow-Bloom, W. B.: Text Book of Histology, Philadelphia, W. B. Saunders Company, 1930, pp. 106 and 107.

between the reticular fibers. It appears that possibly the peculiar arrangement of the fibers at one pole of the nodule constitutes an atrium (fig. 5). Many nodules, however, appear to have no such atria. There is a possibility that in such nodules section has been made at a level below or above what for lack of a better term I have

Fig. 5.—A composite figure showing the oval structure of the nodule and the general parallel arrangement of the fibers at the periphery except at the pole where they are dispersed.

called the atrium, using the term with the reservation that it merely looks like an atrium.

Complete serial sections which are now in preparation may throw further light on this matter, and they constitute the basis for a further report.

DISCUSSION

DR. JOHN B. MCMURRAY, Washington, Pa.: I was assigned to discuss Dr. Novak's paper, but I know very little about the subject.

Encouragement should be given to workers in the field of histopathology. While the true value of their work may not be evident at present, no one can estimate what the future may show.

DR. J. D. HEITGER, Louisville, Ky.: Dr. Novak has presented a new problem. The question probably arises whether this is a pathologic or an anatomic entity. Apparently he has made the claim that it is a new anatomic entity. This may be linked up with the problem of repair in the tonsil. It has been pretty well shown by various observers that when the tonsil reacts to inflammatory changes and repair takes place granulation tissue develops from the stroma and thus repair takes place. The question might arise, on viewing the slides which Dr. Novak presents, whether the possibility exists of catching these fibers in a position where repair had not completely occurred.

The other problem is the possibility of the association of this observation with some of the vital staining methods which have been used. That work has shown that when the stain is introduced into the tonsil, fibrosis favors the speed of its spread along the connective tissue stroma and that lymphocytic infiltration reduces it. Whether that would have any possible relation in this condition, I do not know. The new ideas that are introduced here may appear very insignificant, and yet in later years they may become quite significant, and I am sure all of us will be glad to hear later from Dr. Novak when he is able to give us more definite information.

CONSERVATIVE SURGICAL TREATMENT OF HYPERTROPHIC RHINITIS

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Every physician sees many patients whose chief complaint is a "stuffy nose." The degree of nasal respiratory impediment may vary from occasional stuffiness to almost complete obstruction for a long period. The vasomotor control of the nasal mucous membrane is most active in the second decade of life and is closely associated with, and influenced by, the physiologic changes incident to puberty. This activity often continues into the third or fourth decade of life, with all of the ill effects of mouth breathing and aprosexia due to insufficient nasal ventilation. In addition to recognizing these physiologic changes, one must properly study and evaluate the physical condition of the nasal fossae, such as septal deformities and the position and contour of the inferior turbinates. Today there is a great tendency for physicians, when called on to treat these conditions, to begin at once to look for an intrinsic or extrinsic cause in the greatly overexploited and remote field of allergy with its baffling maze of theoretical and technical deductions. Allergic reactions have their place and must be considered in a given case, but one should be careful not to overlook the possible presence of disease of the accessory sinuses with the consequent thickening of the nasal mucous membrane and the important and often plainly visible local deformities. I have permanently cured many patients whose condition was previously diagnosed as hay fever by a submucous resection of a high deflection of the nasal septum.

These patients must be given relief if possible and, in the absence of a demonstrable allergic cause, must be treated surgically. Since the cause of the obstruction is a highly vascular and much needed anatomic structure of the nasal fossae, viz., the inferior turbinates, the surgical treatment must be of the ultraconservative type.

ANATOMIC STRUCTURE AND PHYSIOLOGY

The inferior turbinates are composed of a thin semicircular bony structure covered by a rather dense and closely adherent periosteum and a thick highly vascular mucous membrane. The thickness of the mucous membrane may vary from $\frac{1}{16}$ to $\frac{3}{16}$ inch (0.15 to 0.45 cm.), depending on the degree of hypertrophy and vascular engorgement. The histologic

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structure of the mucous membrane closely resembles that of erectile tissue found elsewhere in the body. It consists of trabeculae enclosing cavernous spaces which fill with blood when the vasomotor control is relaxed and contract when the vasoconstrictor mechanism is stimulated. The conservative surgical procedures suggested in this paper are effective in eliminating these cavernous spaces to a degree by the substitution of scar tissue.

OPERATIVE PROCEDURE

Local anesthesia is adequate in most cases because the operation is rarely done on persons under the age of 14. For nervous and timid patients a short general anesthesia is preferable.

Parsons,[1] in 1915, described a turbinotomy which so much impressed me by its practical application that I began doing it in selected cases with satisfactory results, and I used it with increasing frequency in subsequent years. One will be disappointed with the Parsons operation alone; it must be supplemented by a divulsion or lateral displacement of the inferior turbinates. About ten years ago I began combining the two procedures with gratifying end-results.

A Parsons serrated, bread-knife-edged turbinate knife is introduced under or into the mucous membrane at the upper and anterior tip of the inferior turbinate and passed backward, close to the periosteum, to the posterior tip of the bone. Then a to-and-fro motion is executed and at the same time the blade of the knife is depressed toward the inferior border of the turbinate. Before the knife is withdrawn it is made to assume its original position, and the serrated edge is turned at right angles to the upper surface of the bone; a vigorous scarification of the entire length of the periosteum is accomplished by a repetition of the to-and-fro motion in an effort to eliminate the cavernous spaces in the mucous membrane.

In this way one is able to effect the formation of much more scar tissue in the mucous membrane and periosteum than it is possible to produce by the old types of cautery or by the use of the more recent electric turbinate needles. In using the latter there is danger of destroying the bone if the heat of the needle is not carefully controlled. I feel that the Parsons knife is especially well adapted for this work because it tends to obliterate the venous spaces in the mucous membrane and it also destroys a great amount of the blood supply which originates in the periosteum. The vasomotor nerve supply is also impaired, and the patient is less susceptible to efferent and afferent stimuli. Following this operation many of the patients are able to forget about their so-called allergic tendencies.

The second stage of the operation consists of a bilateral fracture or outward dislocation of the inferior turbinates by the use of a nasal divulsor. The posterior tip of each inferior turbinate occupies the center of the posterior naris, and when the mucous membrane is hypertrophied the whole space is blocked to nasal breathing. If the bone is fractured or dislocated laterally, the space between the outer and the under surface of the bone and the naso-antral wall is occupied by the turbinate in its new position and the space between it and the septum is correspondingly widened, thus permitting a much more free passage of air. Each blade of the divulsor should be felt in the respective posterior naris and on a level with the bone by passing the index finger up behind the soft palate, and the divulsion

1. Parsons, J. G., in discussion on Pratt, J. A.: Conservation of the Turbinates, Tr. Am. Acad. Ophth., 1915, p. 141.

should be started from behind forward with a rocking motion at ½ inch (1.3 cm.) to the anterior tips of the bones. In order to hold the bones in their new position and to compress the mucous membrane and cause it to become adherent to the underlying scarified periosteum it is necessary to use a splint. A Simpson nasal splint is introduced into each nostril for the full length of the turbinate and packed in place by a string of strips of gauze ¼ inch (0.6 cm.) wide impregnated with bismuth subnitrate, between the splint and the septum. The packing and splint are allowed to remain in place for twenty-four or forty-eight hours; they are then removed, and the nasal fossae are cleansed every other day for from one week to ten days. The operation has been repeated in some intractable cases at intervals of from three to six months because of inadequate formation of scar tissues.

I have been doing this operation for more than fifteen years and have operated in eighty-three cases with uniformly good results. All physicians are impressed with the physical distress of the patients, and some means must be devised for their relief. Radical nasal surgical intervention such as turbinectomy should be resorted to only as a last resort, and then only the lower margin of the bone should be removed.

For years, within the memory of many here, the rhinologic surgeon, in his zeal to improve on the nasal architecture of Mother Nature, cut and snared and burned away any turbinate that had even a tendency to enlarge and encroach on the open road of the nasal respiratory highway. The surgeon, entirely forgetting or ignoring the physiologic function of the turbinates, merely substituted one type of trouble for another, which could not be remedied since removed structures cannot be replaced.

CONCLUSIONS

1. Differential diagnosis must be made between nasal obstruction due to functional disturbances or allergy and that due to physical obstruction.

2. The patients are entitled to relief, and in the absence of any demonstrable cause, either intrinsic or extrinsic, mut be treated surgically.

3. The surgical treatment here suggested is based on the anatomic structure and the physiologic action of the mucous membrane of the inferior turbinates.

4. Parsons' turbinotomy, as described by him nineteen years ago, has been elaborated on and given practical application by me with gratifying results ever since it was first described.

5. Additional ventilation and respiratory space are provided in the nose by the bilateral fracture of the inferior turbinates by the use of a divulsor, one blade of which is placed in each nostril, and by the splinting of the bones until they become fixed in their new position.

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ABSTRACT OF DISCUSSION

DR. J. A. PRATT, Minneapolis: In a paper entitled "Etiology of Hypertrophic Rhinitis" I took exception to the then prevailing etiologic concept and advanced the hypothesis that hypertrophic rhinitis was due to a compensatory hypertrophy in order to reduce the nasal space caused by a deflected septum. Since that time I have seen many instances of compensatory hypertrophy in cases of arrested atrophic rhinitis and in cases in which the turbinates had been amputated.

To show the etiologic thoughts of nineteen years ago, I shall read from my paper "On Compensation of the Turbinates," read before the American Academy of Ophthalmology and Otolaryngology in 1915.

"Hypertrophies of the Turbinates" opposite concavities of deflected septa are compensatory and tend to return to normal following a submucous resection of the septum.

"Localized hypertrophies of nasal tissue when the septum is normal are caused by the irritation of abnormal nasal secretions, as in sinus diseases. When there is turgescence with complete or alternating stenosis with normal septa and sinuses, we should look to some irritating condition of the blood. If this continues, hypertrophic tissue is formed.

"The first step in conservation of the turbinates is to correct the thickened or deflected septum."

It is thus seen that twenty years ago investigators were groping for something in the body that was causing or continuing these hypertrophic conditions which were not caused by a definite, known etiology. This study has turned attention to biochemical factors from a standpoint of automatic imbalance.

Jarvis has shown that the mucous membrane will reflect changes as a result of certain biologic reactions. These changes may be due to alterations of the acid-alkali balance or the sodium-potassium balance, hyperactivity or hypo-activity of certain endocrine glands, excess or deficiency of halogens and variations in fluid intake.

Blackmar based these factors on dominance of the sympathetic or of the parasympathetic system, showing that sympathetic dominance produced an infective zone and parasympathetic dominance produced an allergic zone.

It has been found that persons having clinical manifestations of hypertrophic vasomotor rhinitis or symptoms closely allied to the group all show the findings associated with dominance of the parasympathetic system.

Treatment based on this principle, when combined with necessary surgical procedures on the septum and sinuses, has given the most satisfying results.

Occasionally one finds hypertrophy of the bone of the turbinate which makes the structure so hard that it is impossible to break it laterally. In these cases an incision may be made at the anterior tip and a part of the bone removed by submucous resection.

In case of hypertrophy of the middle turbinate a cystic ethmoid cell is often found in the anterior third of the turbinate, the lateral wall of which may be resected, giving improved drainage to the ethmoid labyrinth and at the same time preserving a middle turbinate.

As far as hypertophy of the inferior turbinate is concerned, my procedure is to correct the septum. Sometimes breaking the inferior turbinate laterally gives a satisfactory result. If this does not succeed, often the posterior tip will be found to be obstructing the posterior naris, and its removal is always justified.

DR. H. M. GOODYEAR, Cincinnati: In the treatment of hypertrophic rhinitis, the essayist has confined himself largely to operation on hypertrophied inferior

turbinates. His technic, with the Parson's knife, is entirely new to me. It is evident that a superior effort is made to preserve the epithelial covering.

That this unusual hypertrophy so often occurs at puberty makes me feel that an unbalance of internal secretions with a disturbance of metabolism plays an important rôle in the overdistention of the cavernous tissue of the turbinates. One-half grain (0.03 Gm.) of thyroid twice daily is often helpful in these cases.

To me, hypertrophy in early adult life usually indicates a low grade infection of the antrums or ethmoid cells. Irrigation of the antrums or injection of iodized oil at intervals is always to be considered.

Removal of hypertrophied mulberry posterior tips from the inferior turbinates is important to breathing and often to the relief of a congested eustachian tube.

Pressing the inferior turbinates laterally with a Carter curet is helpful.

Dr. Clarence W. Engler, Cleveland: I agree with Dr. Dutrow that any surgical procedure on the inferior turbinates should be most conservative, as one does not wish to disturb the normal filtering, moistening and warming functions of these organs.

After having heard the excellent papers of Dr. Kern and Dr. Tobey, it is difficult to understand just how the cure of hay fever is achieved by a submucous resection. Cases in which the condition is suspected to be hay fever, vasomotor rhinitis, atopic coryza or whatever one wishes to call the vasomotor disturbances of the nose demand an investigation into the family history, as it pertains to allergy, and a record of the onset of the symptoms, the environmental factors, the seasonal character, the appearance of the nasal mucous membrane, the results of the skin tests and the eosinophil counts before making a diagnosis of allergy. Nasal operations in cases of vasomotor rhinitis, when not due to bacterial allergens, give poor results. Dr. Dutrow mentions the consequent thickening of the nasal mucous membrane attendant on the presence of diseases of the accessory sinuses. May not such a thickening be due to allergy with the bacteria in the sinuses acting as allergens? In many such cases the membrane returns to its normal thickness after the infection in the sinus is eradicated.

I have not used the technic described by Dr. Dutrow, but have relied on the electric cautery and also electric coagulation to secure the desired shrinking scar tissue with a resulting decrease in the size of the turbinates.

Dr. Howard V. Dutrow, Dayton, Ohio: I realize that even after all these years this method is a departure from the accepted treatment. Dr. Parsons was very modest. I asked him on several occasions at the annual meetings of the Academy to report on his operation, which I considered meritorious, but he never did.

The thing about it that appealed to me at that time was, of course, the destruction of the erectile tissue and the cavernous spaces and the supplemental formation of scar tissue. After one has performed some of these operations, one should be able to observe a dimple in the anterior tip of the turbinate. Where the knife enters, a retraction can be seen. This retraction should extend backward for the full length of the turbinate, or as far back as the knife has gone.

The result will be disappointing at times. In some of the cases a second or a third operation has to be performed. The width of the nasal fossa will also limit the results. If there is a narrow nasal fossa, there is not much distance to move the turbinate laterally with the nasal divulsor.

It is understood that these operations are done as a terminal treatment; by that, I mean after all other possible causes have been eliminated.

REVELATIONS OF DETAILED DIET HISTORIES OBTAINED IN THE PRACTICE OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

COMPARISON WITH ACCEPTED DIETARY STANDARDS

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"Many and serious as are the problems confronting Europe and America at the present time, none is more important than the application of the science of nutrition in the daily life of the people."

These words of E. V. McCollum [1] serve to remind one of the importance of the application of the science of nutrition in the daily practice of ophthalmology and otolaryngology. The literature on ophthalmology and otolaryngology is too poor in information concerning nutrition. Yet it is known that the science of nutrition has made marvelous progress in the past few years. On the other hand, I have not seen descriptions of the dietaries of patients encountered in the practice of ophthalmology and otolaryngology, though Sherman [2a] wrote concerning the average American dietary, and Langstroth [3] gave the diet histories of patients with chronic degenerative diseases, while Lewis [4] reported that a low intake of protein, fat and fluid is common.

Accordingly, an analysis of 350 diet histories is presented, and it is hoped to make immediately available for practical use some of the chief advances in the knowledge of nutrition and to emphasize that patients need to be given the benefit of this knowledge by comparing what they eat with what different authorities say they should eat. It must be kept in mind, however, that persons vary in their nutritive requirements and "a dietary standard at best is 'only an indication, not a rule.'" [2b]

Read before the Los Angeles Society of Ophthalmology and Otolaryngology, May 28, 1934.

1. McCollum, E. V.: Foreword, in Belfrage, S. H., and Yates, Lucy H.: What's Best to Eat? New York, William Wood & Company, 1926.

2. Sherman, H. C.: Chemistry of Food and Nutrition, ed. 3, New York, The Macmillan Company, 1928, (*a*) p. 555; (*b*) p. 544; (*c*) p. 287; (*d*) p. 543.

3. Langstroth, L.: Relation of the American Dietary to Degenerative Disease, J. A. M. A. **93**:1607 (Nov. 23) 1929.

4. Lewis, E. R.: Blood Count, Metabolic Rate and Blood Pressures in Nasal Sinusitis, Ann. Otol., Rhin. & Laryng. **41**:102 (March) 1932.

The first consideration is that of the standard requirements of animal protein. This subject is well introduced for this purpose by quoting from the report of the Committee on Nutrition of the British Medical Association: [5]

> The nutritional or "biological" value of proteins from different sources varies enormously. Proteins of animal origin—milk, cheese, eggs, meat, fish, etc.—have a higher nutritional value and can be much more readily assimilated and made use of in the body than the proteins derived from vegetable sources—peas, beans, potatoes, carrots, etc. . . . Proteins from animal sources are designated as first class proteins, whilst those of vegetable origin are relegated to the second class. . . .
>
> The minimum requisite daily quantity of first class protein has been assessed at 37 grams per day. The Committee is of the opinion that a figure somewhere between 37 and 62.7 (grams per day) should be adopted, and agrees that 50 grams of first class proteins per day is sufficient to maintain the health and working capacity of the average man.

As generally prescribed, the requisite animal protein could be ideally supplied in this way: one glass of milk each meal, making 21 Gm.; one helping (3 ounces, or 85 Gm.) of meat or fish, 16 Gm.; one egg, 6 Gm. —the total being 43 Gm. The other 7 Gm. could be supplied by using milk, eggs and cheese in other foods.

The recommendations of Rose [6a] and Jaffa [7] on the requirements of animal protein closely parallel those of the British Committee. However, the lowest minimum requirement is that of the British Committee—37 Gm. Compared with this, the findings from the diet histories of three hundred of my adult patients are instructive and interesting in view of the present day influences on the American diet. They show that 46 per cent consumed less than 26 Gm. of first class protein a day (a quantity too low for the small woman), while 12 per cent ate less than 13 Gm. a day, which is below one third of the minimal requirements.

Among the three hundred persons whose diet histories were studied were one hundred women, one hundred men employed in the local shops of the Santa Fe Railroad and another group of one hundred men. The subjects were separated this way, as a matter of interest, and all showed the major dietary abnormalities. It was found that 60 per cent of the women had less than the minimal requirements of milk, because of fear of obesity in most cases.

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5. Report of Committee on Nutrition, British Medical Association, Brit. M. J. (supp.), Nov. 25, 1933.

6. Rose, Mary Swartz: The Foundations of Nutrition, revised edition, New York, The Macmillan Company, 1933, (*a*) p. 460; (*b*) p. 319; (*c*) p. 321; (*d*) p. 287.

7. Jaffa, Adele S.: The Jaffa Food Budget: A Minimum Dietary for Health and Efficiency, Sacramento, Calif., State Department of Health, Bureau of Laboratories, 1933, p. 2.

From an analysis of the diet histories of fifty children it is evident that parents are applying to their offspring some knowledge of nutrition. Only five of the fifty had an intake of animal protein of below 26 Gm. a day, the minimal requirement for younger children. In this connection, the report of the British Committee on Nutrition reads:

> A common fault of the dietaries of young children is a shortage of first class protein. The popular prejudice against giving meat and cheese to children of this age is not based on physiological data.

Accordingly, for the diet of a child from 1 to 2 years of age they have listed as the requirement per week: ¼ pound (113.4 Gm.) of minced meat, ¼ pound of fish, ¼ pound of cheese and 7 pints (3.3 liters) of milk, averaging 28.2 Gm. of animal protein a day.

According to Kugelmass,[8] every child from 9 months to 12 years of age should receive three 8 ounce glasses (710 cc.) of milk a day. He added to this a daily portion of meat and egg, the quantity depending on the age of the child.

The children and the adults whose diet histories were studied were private patients seen at the office with diseases of the eye, ear, nose or throat, persons with errors of refraction or injuries from accidents being excluded. The calculations were based on analyses of average helpings from standard sources (e. g., meat eaten once a day was usually listed as 16 Gm. of animal protein). While it is impossible to obtain accurate information about a patient's food consumption from a diet history, for practical purposes a sufficiently true picture is presented when, for example, a patient states that he does not drink milk, eats two eggs every morning and eats meat or fish every day.

A quotation from a leaflet published by the Health Education Division of the Los Angeles County Health Department[9] serves to close the consideration of animal protein and tells their standard of milk allowance:

> Man's protein needs do not change, whether he digs ditches all day or sits at a desk. One pint of milk (the bare minimum for adults) supplies almost ¼ of an average size man's daily protein needs. The other ¾ he can get chiefly from meat, fish, cheese, eggs and cereals. The pint of milk practically supplies his calcium, the mineral that is lowest in the American diet. . . . But a pint of milk is not enough for the adult who would live long in full physical vigor. Double the pint. . . .

This expresses the view of most American authorities on the standard requirements of milk. However, Jaffa[7] places 7 ounces (207 cc.)

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8. Kugelmass, I. N.: Clinical Nutrition and Feeding in Infancy and Childhood, Philadelphia, J. B. Lippincott Company, 1930, p. 87.

9. Nutrition Leaflets, revised edition, Los Angeles, Health Education Division Los Angeles County Health Department, 1932.

as the adult (male) minimum, and the allowance of the British [5] Committee with the cheese supplement runs about the same as that of Jaffa.

Yet the diet histories of my patients show that 44 per cent of the three hundred adults consumed less than 7 ounces of milk a day, including estimates of milk used with coffee, cereals and other foods, and 9 per cent stated that they did not drink milk or eat cheese.

It is largely because of the part played in metabolism by the inorganic ion calcium that the authorities are so insistent on an adequate supply of milk. Sherman [2c] wrote of its importance as follows:

> Osborne and Mendel have shown that healthy, growing animals (rats) can adapt themselves to shortage of chlorine, sodium, potassium, or to magnesium to a striking degree; but that calcium and phosphorus are always needed in relatively liberal amounts.

Vitamin D serves the purpose of increasing the absorption of calcium and phosphorus and of increasing the efficiency of calcium and phosphorus metabolism. It occurs in great concentration in fish liver oils and in the body oils of some fish, such as the salmon, tuna and sardine. However, considering the foods most commonly eaten in this country, eggs and butter fat are the chief supply of this vitamin in the daily diet, and not much is found in butter.[10] In winter concentrated supplements are recommended as the optimal standard in addition to one egg, usually, and some butter each day. Sherman [2d] mentioned that the standards for vitamins are necessarily not so clearly defined as those for proteins or for minerals. Yet 10 per cent of my patients evidently had a vitamin D intake below the minimum, since they reported that they did not eat eggs or fish and consumed less than 34 Gm. (three pats) of butter fat (including milk) a day. Two per cent used butter substitutes and did not eat eggs or fish.

Information concerning the rôle of vitamin A in infections is given by Hess [11] in a report on his own investigations:

> We do not believe that the average child requires any supplement of Vitamin A above what it receives in 24 ounces of milk. . . . There is no clinical basis for considering or designating vitamin A as the anti-infection vitamin.

According to Hess [12] and others, in cases of vitamin C deficiency with scurvy there is associated a heightened susceptibility to bacterial infection. However, the deficiency must be of extreme degree before

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10. Clause, Ruth Cowan: Vitamin D, J. A. M. A. **99**:306 (July 23) 1932.

11. Hess, A. F.; Lewis, J. M., and Barenberg, L. H.: Does Our Dietary Require Vitamin A Supplement? J. A. M. A. **101**:657 (Aug. 26) 1933.

12. Hess, A. F.: Recent Advances in Knowledge of Scurvy and the Antisorbutic Vitamin, J. A. M. A. **98**:1429 (April 23) 1932.

scurvy develops. It takes only one-half the number of vitamin C units to protect animals against scurvy as are required to prevent degeneration of their teeth.[6b]

Vitamin C is found in fresh fruits and green vegetables mostly, and in potatoes. In diets otherwise adequate the standard of vitamin C requirement for adults as proposed by Rose [6c] is a minimum of 30 units a day, or the amount found in 2 ounces (59 cc., 25 calories) of orange juice. Hank [13] recommended from 8 to 16 ounces (236 to 473 cc.) of orange juice in the prevention and treatment of dental pathologic processes. This is more in line with the quantity of fruit juices used by Langstroth [3] in his corrective diet. Yet in contrast to this is the standard dietary of the British Committee on Nutrition,[5] in which is listed a minimum of 100 calories a week (15 calories a day) of fruit and green vegetables. Only 2 per cent of my patients fell below that standard.

It was interesting to observe that of the dietaries of three hundred adults, only 27 per cent showed no errors or deviations from the standard requirements. The other 73 per cent showed from one to four individual deviations, i. e., were below minimal requirements as regards one or more types of food essentials.

The vitamin B complex occurs in practically all foods except the fats and such refined foods as white flour and sugar. The requirements of the vitamin increase with the rate of growth and the increased expenditure of energy. Accordingly, all children and those adults whose metabolism is increased, as by physical exercise or fever, should be generously supplied with vitamin B.[6d]

Emphasis needs to be placed on the importance of taking detailed diet histories as a routine procedure, since by this means miscellaneous errors of diet are revealed and can be readily corrected. One patient had been drinking fifteen cups of coffee a day for two years. Others were drinking from six to ten cups of coffee or tea. Some patients drink only one or two glasses of water a day. Some take excess quantities of fruit juices and for lack of proper instruction limit the intake of first class proteins. A common and serious error of sedentary persons or of persons with low metabolism is found in the excess consumption of bread and other cereal foods to the exclusion of the first class proteins and (or) protective foods. Langstroth's [3] corrective diet allows no bread or foods made with flour, and Marks' [14] high vitamin diet allows only three slices of bread a day plus pure wheat germ.

13. Hank, M. T.: Diet and Dental Health, Chicago, University of Chicago Press, 1933, p. 49.

14. Marks, H. E., in Bridges, M. A.: Dietetics for the Clinician, Philadelphia, Lea & Febiger, 1933, p. 40.

REPORTS OF ILLUSTRATIVE CASES SEEN IN OTOLARYNGOLOGIC PRACTICE

The following reports show some of the individual deviations from the dietary standards. They also show the practical value of taking a routine diet history in the practice of otolaryngology, for by means of it the different dietary abnormalities are easily detected (or may not be detected without it), and the proper food may be readily prescribed with other therapeutic measures.

CASE 1.—Mrs. H., aged 54, had numerous local and general complaints and badly infected tonsils. Part of her diet history showed the following food consumption a day: animal protein, 12 Gm.; milk, 5 ounces (148 cc.); eggs, none; butter, two pats; water, three glasses; bread, six slices; jam, daily; fruit and vegetables, standard intake. The diet was thus deficient in animal protein, calcium and vitamin D. After three weeks on a proper diet her health improved, and she stood the tonsillectomy with no unusual disturbances.

CASE 2.—Miss J., a nurse, aged 35, gave a history of three operations on the sinuses, one of them radical, during the past two years. Headache and other symptoms were incapacitating. From a diet history it was found she was living on fruits and vegetables mostly, with practically no animal protein and was drinking over three glasses of fruit juice a day. On a changed diet and conservative measures she was soon able to go to work.

CASE 3.—A working man, aged 58, had been treated by his family physician for several weeks for "stomach trouble" and other complaints. Because of headache and obstructed breathing, he was referred for examination of the sinuses. The diet history revealed that he had been taking 3 or 4 quarts (2.8 to 7.8 liters) of milk daily. Milk was eliminated from this diet, and his symptoms began to disappear at once. Later tests found him to be sensitive to cow's milk.

NOTE.—The routine method that I now use in taking a diet history is to let the patient fill out a detailed diet history blank. This is then rechecked while the patient is given instructions about his diet.

COMMENT

Concept of Constitutional Change; Its Therapeutic Possibilities.—Changes are made in the animal constitution by various factors. For example when a patient's dietary is changed, as from a low to a high protein intake or by the substitution of milk for bread, an almost infinite number of changes take place in the chemical and the physical constitution. In other words, alterations occur in the different tissues of the organism following changes in the diet or the use of chemicals or other agents. Lewis [4] described some of these changes, and observed that when the constitution of a tissue is altered it reacts differently to a disease process, and may be successful in freeing the organism of an otherwise persistent or fatal disease.

Brown,[15] of the Rockefeller Institute, using various agents on labora-

15. Brown, W. H.: Harvey Lectures, 1928-1929, Baltimore, Williams & Wilkins Company, 1930, p. 140.

tory animals, also observed the effects of constitutional change on the course of disease. He said:

> In like manner, the course of disease may be affected favorably or unfavorably by chemical agents which act not on the parasite but on the host, such as the iodides, or by the use of conditions which involve nothing more than a difference in light environment.

In other words, chemical agents make the disease condition better or worse, and a shift in the diet has the same power. Yet a shift of the diet in the right direction puts such a dietary change in the rôle of an unusually important therapeutic agent.

Some Uses of a Detailed Diet History.—By means of such a history dietary errors are found and their correction is facilitated.

The history is useful in making a differential diagnosis. For instance, a patient may have any number of complaints resembling those of a focal infection. The diet history reveals a nutritional disaster. An unnecessary operation is then prevented.

The history is useful, moreover, in determining the prognosis. The more serious the deviations from the standards the better the prognosis.

SUMMARY

Nearly half of my patients were markedly deficient in animal proteins and in calcium.

A much smaller percentage (10 per cent) were deficient in vitamin D, and a still smaller percentage (2 per cent) were deficient in vitamin C.

Seventy-three per cent needed guidance in the choice of their food.

The influence of dietary changes may be considered as follows: Dietary change→chemical and physical constitutional change→change in the reaction to a disease→change in the course of the disease.

REINFECTION OF THE WOUND FOLLOWING MASTOIDECTOMY

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The desired end-results after simple mastoidectomy are complete healing of the wound and a dry middle ear. With modern surgical methods and competent after-care, there are but few cases in which healing does not occur promptly, and in these an incomplete operation, extension or complication of the disease or some constitutional dyscrasia is usually to blame. Then, too, there is a type of acute suppurative mastoiditis, notably that which occurs after scarlet fever, in which elements of chronicity are present from the onset of the disease and in which the middle ear may never become dry after simple mastoidectomy.

The length of time required for the wound to heal and the middle ear to become dry varies greatly. There have been cases in which even with a completely destroyed mastoid and a large subperiosteal abscess, the wound has healed in ten days. In other cases a small fistula may be present, which will persist for months before closing.

The healed cavity first fills with firm granulations, which soon become converted into connective tissue. Into this, mainly from the periosteum, grows new bone. The amount of new bone and the rapidity of its growth vary greatly. There have been cases in which many years after the primary operation a secondary operation has shown little new bone; in others, what appeared to be a practically normal mastoid was found, with small cells and even normal anatomic outlines. As a rule, the regeneration of bone is somewhere between these two types, and the mastoid process rarely recovers its original normal appearance. The new bone forms a hard shelf, which covers a cavity about the antrum. This cavity is filled with firm connective tissue, which does not change.

Reinfection of the wound occurs frequently. It is my object in this paper to discuss not the infections which occur before the wound is first healed but those which develop a considerable period after simple mastoidectomy, when the patient has been discharged as cured.

The same type of infection which causes any acute otitis may cause such reinfection, and in any case in which acute suppurative otitis media develops in a patient on whom mastoidectomy has been performed, one must be continually on guard for signs of infection in the wound and the prognosis must be made accordingly.

It must be borne in mind that in place of the normal lining tissue in and about the antrum, there is in the postoperative cavity a dense connective tissue, which is easily broken down by infection. Once this has occurred the normal membrane of the aditus becomes swollen and the proper egress of pus through the aditus is prevented. Then the symptoms of reinfection of the wound present themselves.

Pain and tenderness over the mastoid are always present, together with the constitutional symptoms of infection. Swelling in and about the scar occurs, the amount and rapidity depending on several factors: first, on the blocking of drainage through the aditus; second, on the amount and character of the new bone which has been formed, and third, on the type of infection.

The symptoms may come on suddenly or slowly. The temperature may be low, or it may be as high as 104 or 105 F. for a period of days. Headaches, as a rule severe, localized to the affected side, are usually present. There are at first postauricular redness and edema; the edema progresses until the infection has burrowed its way through the newly formed tissue and forms a subcutaneous abscess.

The patient is as acutely ill as he was with the original infection, and the point arises as to whether a complete mastoidectomy should be performed. Especially is this point raised when roentgenographic examination shows cells—whether newly formed or left at the previous operation—in the mastoid.

When exenteration is again performed in such a case, a large amount of pus, under pressure, and diseased granulations are found in the cavity about the antrum. Yet this is to be expected and in itself is not a reason for a new complete operation.

In the vast majority of cases, this purulent process breaks through the new bone and becomes superficial, and a small incision through the skin is all that is required to relieve the patient. The subcutaneous swelling may not appear until after many days, and during this period the patient suffers considerable pain. But unless there are signs or symptoms of complications there is no indication for immediate operation.

It seems, therefore, that those cases of secondary infection in which complete mastoidectomy is needed are extremely rare. This holds true even when there are several reinfections and postauricular incisions are necessary. Only when the original mastoidectomy has been incompletely and inexpertly done should a thorough mastoidectomy be considered following the first reinfection.

The postauricular abscess may empty itself completely through the aditus and the middle ear. Often edema of the scar appears, but with sufficient drainage from the middle ear it clears up completely.

REPORT OF CASES

CASE 1.—Miss M. M., aged 19, was seen on May 16, 1932. Twelve years before, simple mastoidectomy had been performed on the left side, with prompt healing. There had been no further "otitic trouble" until three weeks before examination, when acute suppurative otitis media developed, with severe pain over the region of the mastoid and headache. The temperature ranged between 102 and 104 F. for six days. A slight swelling appeared in the scar, which gradually became larger. On May 23, the swelling became large, the temperature dropped to 100 F., and the headache became less marked. On May 25, a small incision (½ inch [1.27 cm.] in length) was made in the lower part of the original wound, and a large amount of pus was evacuated. The condition cleared rapidly, and ten days later there was no discharge from the middle ear and the wound was healed. There has been no recurrence.

CASE 2.—M. R., aged 2 years, was operated on on March 19, 1928. Simple mastoidectomy was performed on the left side. The right middle ear was normal. In December 1929, following infection of the upper respiratory tract, bilateral acute suppurative otitis media developed, and there was reinfection of the wound. Four days later, an incision was made in the lower angle of the wound, and pus was evacuated. The wound healed quickly, and the middle ear became dry. In December 1930, there was reinfection of the mastoid, and an incision was made. Since then there have been severe attacks of acute suppurative otitis media accompanying infections of the upper respiratory tract, but the wound has remained unaffected.

CASE 3.—E. W. had scarlet fever and bilateral acute suppurative otitis media in 1924, at the age of 18 months.

In February 1928, bilateral acute suppurative otitis media developed, with spontaneous rupture of both ear drums. Eight days later, there was nystagmus to the right, and the child complained of dizziness on sitting up. Two days later bilateral mastoidectomy was done. The disease was of the coalescent type. The sinus and dura were exposed by operation on the right side. Recovery was uneventful, and in a short time both wounds were healed.

In March 1931, acute suppurative otitis media developed on the right side, and pressure over the scar forced pus through the opening in the tympanic membrane. There was no swelling of the wound, and the condition cleared rapidly.

On Jan. 14, 1934, the child, now 11 years old, had an infection of the upper respiratory tract. Five days later, there were severe pain in the right ear and spontaneous rupture of the tympanic membrane, with a profuse mucopurulent discharge. From the onset of the otitis, there were severe headaches, which were not localized and were hardly controlled by analgesics. The discharge from the middle ear became less, and a swelling developed in the mastoidectomy wound, which gradually grew larger and was tender. In view of the severe headaches, suggestive of an intracranial complication, the patient was removed to the Beth Israel Hospital on February 4. The intention was to explore the cavity. When the wound was incised, a large amount of pus under pressure was evacuated, which was coming through a perforation in a shelf of new bone. Beyond this was a large cavity, which was clean. In view of these findings no further surgical intervention was done.

Between February 4 and February 9, the temperature, after a postoperative rise to 104 F., ranged between 99.6 and 102 F. During this period there were severe headache, restlessness, chilly sensations and pains in the neck.

The child was then seen by Dr. Emil Altman, and a diagnosis of a meningitis sympathica was made. Lumbar puncture showed a slightly cloudy fluid, which produced faint reduction of copper, indicating the presence of dextrose, and contained 970 cells per cubic millimeter, 88 per cent of which were polymorphonuclears. The smear was negative for organisms. The culture was contaminated.

On Februay 10, examination by Dr. Altman showed facial palsy on the right side peripherally, markedly diminished knee jerks, slight ankle clonus bilaterally and a rigid neck. Dr. Altman believed that surgical intervention was not indicated, and urged that repeated lumbar punctures be performed to give relief from the meningeal symptoms. Dr. Kopetzky saw the patient and expressed the opinion that there was present the first phase of general meningitis, and in addition to the lumbar punctures, he urged immediate decompression through the mastoid wound. This was done. On exposure the dura bulged into the mastoid cavity. The sinus was then exposed through its entire length, and the bone in Trautman's triangle was removed. A radical mastoidectomy was performed.

Between this operation on February 10 and 17, the temperature was unchanged, and the clinical course continued as before, with headaches, chilly sensations, restlessness and irritability, although the rigidity of the neck became less marked and the facial paralysis cleared up quickly. The spinal fluid at times showed a reduction in the number of cells and at other times an increase, the greatest number being 1,600 on February 17. Dextrose was no longer present, and on February 16 and 17 a few colonies of Streptococcus pyogenes-haemolyticus were found on culture.

On February 17, the temperature rose to 105 F.; it then dropped suddenly to normal and remained so until the patient was discharged from the hospital on March 15.

Between February 10 and 17, four small transfusions (100 and 50 cc) were given at the request of Dr. Kopetzky. These did not appear to influence the course of the disease or the general condition of the patient.

Comment.—This case was undoubtedly one of meningitis sympathica. Whether the second operation and radical mastoidectomy were essential is open to question.

It was interesting to note at this operation that the sinus and dura, which had been widely exposed at the mastoidectomy six years before, were covered by a solid layer of bone, and that in spite of the physical signs and symptoms there was no apparent disease.

In spite of the finding of the few colonies of hemolytic streptococci in the spinal fluid, it does not seem probable that true meningitis was present.

The value of the small transfusions (four) is questionable.

CASE 4.—J. K. had had acute suppurative otitis media on the right side in 1929, at the age of 2½ years. In March 1932 acute otitis media developed on the left side and paracentesis was performed. Later in the year acute otitis developed again on the same side, and mastoidectomy was performed.

In March 1934, following an infection of the upper respiratory tract, bilateral suppurative otitis developed, with marked tenderness in the scar on the left side. Since the original mastoidectomy had not been done by me, roentgenograms were taken, which showed the presence of cells in the zygoma and at the tip.

The temperature ranged between 101 and 104 F. for five days, and then a large swelling appeared in the scar. This was incised, and within two weeks the middle ear and mastoid were dry.

Comment.—In spite of the incomplete operation on the mastoid and the presence of cells, a simple incision was sufficient to relieve the patient. It is often stated that the presence of these cells predisposes the patient to further attacks, but in my opinion this rarely holds true, and unless there are repeated infections the complete operation is not indicated.

CASE 5.—M. R., aged 6, had had several attacks of acute suppurative otitis media. In May 1933 simple mastoidectomy was performed on the left side, with prompt healing.

In March 1934 acute suppurative otitis developed on the left side, and the original wound became swollen and tender. For four days, the temperature ranged between 100 and 103 F. On the second day a profuse discharge ensued from the middle ear, and the swelling gradually receded. The temperature dropped gradually to normal, and within two weeks the middle ear was dry.

CONCLUSIONS

1. Reinfections of the wound following mastoidectomy are frequent.

2. In the vast majority of cases a small incision through the lower end of the wound is sufficient to drain the abscess, and complete recovery ensues.

3. Complete mastoidectomy should be considered only when there are signs or symptoms of threatening complications or when there is evidence of an incomplete surgical procedure at the original operation.

4. Many cases of reinfection of the wound clear up without incision if drainage through the aditus and middle ear is sufficient.

7 West Seventy-First Street.

Progress in Otolaryngology

A Summary of the Bibliographic Material Available in the Field of Otolaryngology from Sept. 1, 1933, to Sept. 1, 1934.

FUNCTIONAL EXAMINATION OF HEARING

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In the last year, as in the past few years, there has been a great dearth of papers on the subject of functional testing of hearing. Most of the articles have been found in the American and the English literature. The topic of the unmasking of simulated deafness has interested a considerable percentage of those who have lately written on hearing tests.

Northington [1] presents a group of cases of Ménière's syndrome, none of them being instances of true Ménière's disease. The functional examination of the ear is one of several procedures for the determination of the cause of disabilities referable to the ear or to the vestibular mechanism as a whole. The usefulness of this examination depends on a correct interpretation of the aural tests as well as other available evidence. Northington's experience reveals that patients with Ménière's syndrome have no inflammatory disease or traumatic lesion of the ears or evidence of disease of the central nervous system which can be determined by functional testing of the ears or by general neurologic examination.

The cochlear function seems to suffer more than the vestibular. Ménière's syndrome occurring with purulent infection of the middle ear is usually an indication for an operation on the ear. The cochlear and vestibular tests in these cases give dependable information as to the condition of the inner ear as well as some signs of an intracranial complication.

Dundas-Grant [2] describes a comparatively simple optical method for determining the rate of decrement of a tuning fork. A simple concave

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1. Northington, Page: Functional Ear Examinations in Patients with Ménière's Syndrome: Report of Cases, Laryngoscope **44**:85 (Feb.) 1934.

2. Dundas-Grant, James: Simplified Method of Determining Percentages of Actual Hearing-Power in Tuning Fork Tests, J. Laryng. & Otol. **49**:233 (April) 1934.

mirror is attached to the outer side of one prong of the tuning fork close to the tip. A counterweight is attached to the other. The fork is fixed in a vise, and a light is directed on it from a spotlight or a bull's-eye lamp fitted with a diaphragm having a central perforation 0.5 mm. in diameter. The light is directed on the mirror and is reflected from it as a dot on a sheet of cardboard. When the fork vibrates, the dot changes into a vertical line which shortens more or less rapidly. The time required for it to shorten from any length to half that length is timed with a stop-watch. Two diverging lines are ruled on the cardboard, and these are joined by vertical lines ⅛, ¼, ½ and 1 inch (0.3, 0.64, 1.27 and 2.5 cm.) in length. The board is placed so that the vertical line of light is over one of the longer lines, and when the line is reduced to one-half its length, the time measured with the stop-watch represents the half amplitude time. For the highest pitched forks (2,048 and 4,096 double vibrations), the observer stands with his ear 6 feet (182.8 cm.) from the vibrating fork and then comes toward it so as to keep the loudness at the same degree till he is 3 feet (91.4 cm.) from it. The number of seconds required for this represents the half amplitude time. With the half amplitude time, the percentage of audition can be determined by dividing and subtracting certain fixed numbers and then referring to a table printed in the paper. A chart is presented for calibrating the forks, and its application is fully described.

David-Galatz [3] has made a study of the Weber test and its relation to bone conduction. He states what has long been recognized, that when a tuning fork is placed on the vertex of a person with normal hearing there is no lateralization of sound, but the subject states that he hears equally well in both ears or that he hears the sound "in the head." With impairment of the sound-conducting apparatus the sound is usually lateralized to the worse ear, and if the conducting apparatus of both ears is impaired the sound is heard in the worse of the two ears. With impairment of the sound-perceiving apparatus of the inner ear, the sound is usually lateralized to the better ear, and when both ears are the seat of involvement of the inner ear the sound is heard in the better ear. The author divides the perception of sound by bone conduction into two types: one which is fixed and another which shifts or "travels," as he says. He has modified the Weber test by having the patient occlude with the finger one external auditory canal and then the other, after first performing the Weber test in the ordinary manner. If, for instance, the sound is lateralized to the right ear and with occlusion of the left ear the lateralization still remains in the right

3. David-Galatz, I.: Regarding the Localization of Sounds and Perception by Cranio-Osseous Conduction, Ann. d'oto-laryng. **6**:576 (June) 1934.

ear, the condition is called fixed perception; but if occluding the left ear causes the lateralization to shift from the right to the left side, it is called shifting or traveling perception.

David-Galatz divides the cases into several groups: 1. In subjects with normal hearing one can cause lateralization to the ear that is occluded even though there was no lateralization before, thus giving a shifting conduction.

2. When there is merely a disturbance of the external auditory canal with lateralization to that side, the lateralization may be changed to the well ear by occluding it, thus giving a shifting transmission.

3. With a unilateral lesion of the middle ear the sound is fixed in the diseased ear and cannot be made to shift by occluding the well ear.

4. With bilateral involvement of the middle ear the sound is fixed in the middle of the vertex and does not shift to one side or the other with the occlusion of the external auditory canal.

5. With partial lesions of the inner ear the sound is lateralized to the well ear or the less diseased ear, but will shift to the more diseased ear or the worse ear when the canal is closed. Hence, the conduction is shifting.

6. With complete lesions of the inner ear the sound is lateralized definitely in the well ear and cannot be changed by occluding the opposite ear.

7. With involvement of both the middle and the inner ear, whether of one or of both sides, the shifting is determined by the lesions of the inner ear just as though involvement of the middle ear were not present.

It is true that the lateralization with the Weber test may be changed at times by occluding one or the other ear, but we are in doubt whether this modification is essential in making the test, although it does, perhaps, give further information regarding the severity of the lesion, especially in the middle or the inner ear.

In an analysis of the results of the Weber test in one hundred cases published by one of us (R. S.) in the *Laryngoscope* of May 1911, the following conclusions were drawn:

1. The position of the tuning fork as regards the vertex or the forehead is apparently important (from 11 to 15 per cent of the patients in this series showing a difference in response with the fork in the two positions). The fork is usually heard longer and louder when it is placed on the forehead, especially when the hair on the vertex is thick.

2. The dependability with reference to lateralization does not seem to vary much with the different forks used in these examinations. The disadvantages of the A fork lie (1) in its great weight, which, while allowing it to be easily rested on the head, sometimes causes discom-

fort or even pain, and (2) in the difficulty of distinguishing between feeling and hearing it. The disadvantage of the a-1 fork lies in the fact that unless it is struck rather hard it is not heard distinctly on the vertex, and when thus struck it is often heard only via air, thus at times giving a wrong result unless this fact is especially noted. The weighted Edelmann c-1 fork seems to have the good qualities of both of the forks just mentioned (as regards the duration of the vibration, etc.) without the disadvantages. There is a difference between the A fork (108 double vibrations) and the weighted c-1 fork (154 double vibrations) of only 46 double vibrations. These statements, however, refer only to the use of these forks in performing the Weber test.

One hundred cases constitute a rather small number, yet judging by these, it is perhaps not presuming too much to say that: (1) the Weber test confirms the diagnosis in many cases when it is used in conjunction with other functional tests and when the results agree with those obtained by the other tests; (2) it is of no aid in some cases, (3) it even causes uncertainty in some instances, owing to its great variability and its tendency to give contradictory results.

Hallpike [4] suggests that otologists consider deafness more in terms of functional tests. The most important of these tests at one's disposal is the so-called pure tone audiogram. This is true because it bears a fairly constant, intelligible and often illuminating relationship to the complete performance of the ear in dealing with speech. It also forms a promising basis from which the construction and prescription of hearing aids may be expected to arise. Not infrequently, a marked loss of hearing for speech may be present with a comparatively small loss of hearing for the vibration of the tuning fork. This, Hallpike believes, is due to the one inherent defect of tuning fork tests, namely, that the stimulus applied is of the "dying-away" variety. Workers on threshold values of the senses other than the auditory sense have also found errors of this type when the stimulus applied is of the "dying-away" variety.

Important differences exist between experimental conditions obtained during pure tone tests and those during the ordinary conversation test. In listening to pure tones, the stimulus is more or less prolonged and the tone factor is negligible, whereas in listening to speech the time of action of the stimulus may be of considerable importance. However, in spite of this difference, published results of workers employing well controlled audiometric methods justify the view that significant discrepancies between the results of pure tone tests and those of speech tests do not occur.

4. Hallpike, C. S.: Hearing Aids and Hearing Tests, J. Laryng. & Otol. **49**: 240 (April) 1934.

It is justifiable to say that valuable insight with over-all loss of hearing for speech is provided by accurate pure tone audiograms.

The audiogram can be employed as a basis for the building of hearing aids by the construction of receiving circuits with or without amplifying valves which have a resonance corresponding to the frequency band of the deafness. A method was described by the late Mr. Wharry. Good results were obtained, the difficulty being the accurate fitting of the resonances of the instrument to the areas of hearing loss.

The varying effect of extraneous noise in different types of deafness is another factor which deserves consideration. A person with deafness of the senile type is often much disturbed by these noises and is frequently best helped by an apparatus such as a speaking tube, which tends to exclude all but the speaker's voice.

MacFarlan [5] records the following observations on tactile sense as related to hearing after examining many subjects with various degrees of impaired hearing: The deaf person has no greater tactile sensation than the person with normal hearing. In occasional cases the perceptive sphere of the deaf person is much more acute and he is often much more "touch conscious." The pressure of a vibrating body on the skin is variable, especially since it is difficult to invent any method of accurately standardizing or controlling pressure; considerable variation also occurs in the testing of various persons. The after-images of tactile sensation are more conspicuous and more common than the auditory images. There is a macula of greatest perception, as with seeing. Above and below this are indefinite zones of weaker perception. The perception at the center of the macula is at a frequency of 256 double vibrations. In testing the deaf, one must keep in mind that the response of the patient may be not to hearing but to feeling. Therefore, methods should be used to make certain that there is no confusion.

MacFarlan [6] presents methods for testing the hearing of the preschool child. In quantitative tests on children 2 years of age a buzzer audiometer is used, the sound being transmitted over a telephone circuit in which a decibel meter has been placed. The child is first taught to raise the hand when the sound is heard and to lower it when it is imperceptible. When the child understands what is wanted, the decibel meter is introduced and the loudness of the sound gradually reduced until the responses are uncertain or inaccurate. Operation of the cut-off must be concealed. For testing the hearing of children between 2 and

5. MacFarlan, Douglas: The Tactile Sense as Related to Hearing Testing and Hearing Impressions Through Nerves Other than the Eighth, Ann. Otol., Rhin. & Laryng. **42**:680 (Sept.) 1933.

6. MacFarlan, Douglas: Testing the Hearing of the Preschool Child, Arch. Otolaryng. **19**:514 (April) 1934.

6 years of age, a 4-A audiometer with a phonograph record of common monosyllables in the vocabulary is used. Individual testing is necessary. A decibel meter is plugged into the audiometer on one side, and an ear phone is led off from the other side. The speech comes through at a single level of intensity until the meter is turned down, which reduces the intensity. The child recites what he hears until he begins to miss words or misinterprets them. For the normal child this point is referred to as the reading for normal hearing. Dr. Crowden of the University of London has simplified the test. He had a phonograph record made of about twelve commonly known names, such as dog, cat and door. The objects are illustrated on a card which is placed in front of the child. As he hears the word he points to the proper picture on the card. The intensity of the sound is reduced, and the level of intensity at which words are missed is the index of the loss of hearing.

MacFarlan feels the urgent need for determining the degree of impairment of hearing in the preschool child, as it is an important factor in the future of the school child. The author will help any one who wishes them to obtain these records.

Fowler [7] again presents the methods for testing the hearing of school children and also describes the use and advantages of the audiometer. This instrument indicates sound intensity by measuring the electrical energy necessary to produce it. The threshold of hearing at each frequency represents the minimum amount of energy necessary to produce a sound just audible. The audiometer not only tests hearing acuity but aids in making a diagnosis. One must use both bone conduction and air conduction receivers to obtain complete information. In this way, losses of hearing by both bone and air conduction are estimated in the same units, which is a decided advantage. The same thing can be done with tuning forks. The bone conduction receiver has an advantage over the tuning fork used for testing bone conduction in that variations in pressure of the fork influence the decrement of the fork, which does not occur with the bone conduction receiver of the audiometer. Fowler states that "after twelve years' use, I have become convinced that the audiometer is the most accurate, rapid and satisfactory machine yet devised for testing the hearing."

When results obtained with the audiometer do not correspond with those obtained with the tuning fork, it means that the latter are not so accurate as was imagined. If a comparison with one's own hearing is made when tuning forks are used it means that the examiner's hearing is not so perfect as he believes it to be. The 1-A and 2-A audiometers are not of great help for testing groups, except from the standpoint of

7. Fowler, E. P.: Methods of Testing and Management of the Deafened School Child, New England J. Med. **211**:364 (Aug. 3) 1934.

accuracy and for furnishing information as to audiometric measurements in general. The 4-A (phonograph) audiometer is the instrument used for testing groups of forty or more at one time by calibrated speech first by a man's voice and second by a woman's voice, numbers being used so that the child listening may write them down until they become too faint to be heard. The point when the child no longer hears is noted, and by means of master cards the loss of hearing in sensation units is obtained. A loss of less than 20 sensation units indicates a slight loss of hearing; from 20 to 40 units, a moderate loss; from 40 to 60 units, a marked loss; from 60 to 80 units, a very marked loss, and over 80 units, an extremely marked loss. Extraneous noises must also be taken into consideration. On the average, a loss of at least 10 sensation units may be considered normal in a moderately quiet room. In cities it is difficult to test persons with normal hearing unless sound-proof rooms are used, for the noises vary considerably, from 40 to 60 decibels.

One objection offered to the 4-A audiometer is that retests show about from one fourth to one third of those found deficient on the first test as being above the minimum standard on the second test. This can never be avoided as the hearing cannot be rendered stable, and variations up to 10 sensation units may be observed in normal persons owing to extraneous noises and changes in environment or in barometric pressure. Taking these things into consideration, a loss of 9 sensation units was the amount chosen to denote a significant loss. From the standpoint of prevention, a loss of 6 sensation units should be taken, as many of the children have a history of aural disease.

Fowler does not agree with the opinions of some otologists that it is useless to examine children for deafness because those who have deficient hearing due to diseases of childhood either get well spontaneously or are not improved by treatment. He says that it has been shown by repeated audiometric tests that if properly managed over 60 per cent of all children referred to otologists from school are benefited, and that lapses in treatment and management are accompanied frequently by tragic results to health and to hearing. Even if this were not so, the child's usefulness derived from an educational standpoint by calling attention to the problem of deafness has accomplished a great deal.

After detecting deafness, a satisfactory otolaryngologic examination is made, and tests are carried out with a 2-A audiometer. An easy method to determine the patency of the eustachian tube while it is under constant observation through the magnifying speculum is to produce a slightly lower air pressure in the external meatus and to observe whether the drum membrane remains stationary while the patient swallows. Unless the tube is capable of overcoming the slight negative air pressure in the middle ear during swallowing, the mechanism is not functioning normally. This is better than catheterization and politzerization, as both of the latter measures inflate the middle ear with pressures greater than

those normally present in the nasopharynx and prove only that air can be blown through the tube by force. Another sign of a patent tube is the fact that if the drum membrane is easily depressed by meatal air pressure there is no vacuum in the middle ear. If there is no vacuum there can be little blocking of the tube. Fowler believes the politzerization and catheterization are greatly overestimated and in some cases harmful. The diagnosis is placed on the card, and advice is given as to the urgency for treatment, hearing aid, lip reading, speech training, special school, etc. The outside otologist administers the treatment.

Crowden [8] shows the value of audiometric tests on children in the elementary schools. The 4-A gramophone audiometer developed by the Bell Telephone Research Laboratories in New York was used. A systematic routine consisted in finding and measuring the defects by audiometric tests, medical examination and medical or surgical treatment, together with retesting each child by audiometer to determine the effect of treatment and finally arriving at a decision with reference to the subsequent care of the child. A loss of only 9 units was considered normal hearing, a loss of from 9 to 18 units a minor impairment and a loss of from 21 to 30 units partial deafness. Of 5,216 ears tested, 96.28 per cent had hearing within the normal threshold, 2.97 per cent showed a loss of from 8 to 18 units and 0.75 per cent had a more severe degree of impairment. Children having a loss of from 9 to 18 units are not seriously handicapped in school work, although they should be given a suitable place in the classroom. If this loss persists, they should be placed in schools for the hard-of-hearing. Those with a greater loss should receive special educational care in these schools.

Children of preschool age require other records for testing. A record of simple words representing the earliest pictures of objects used in the teaching of such children is employed. The child is instructed to pick up the picture of each object when it hears the name called through the headphone. Children of 5½ years have been successfully tested by this method. Recently, Mr. Cowan has improved the test by devising a model containing shutters in which the pictures named on the record are painted, and which can be pushed down as the name is called. Children of 4½ years readily cooperate in the test, as it is particularly attractive.

Becker [9] describes a test which is a modification of the Schwabach test for bone conduction. This is performed by having the examiner place a vibrating fork on the mastoid opposite the ear to be tested. He then presses his own auricle against the auricle of the ear to be tested, converting his own auditory meatus and that of the patient's into a closed cavity. The patient informs the examiner when he no longer

8. Crowden, G. P.: The Use of the Audiometer, J. Laryng. & Otol. **49**:247 (April) 1934.

9. Becker, B. M.: Schwabach's Test: The Author's Test; A Comparative Study, Laryngoscope **44**:545 (July) 1934.

hears the sound. This time is noted, and the difference in seconds between his own hearing and that of the patient is also recorded. The principle of this test is based on the following facts: A vibrating tuning fork placed on any part of the skull sets up vibrations in the air contained in all the cavities of the skull. These are carried to the labyrinth, via the sound-conducting apparatus, and there heard as sound. Obstruction of the external canal will prolong the sound and produce the maximum degree of bone transmission. Obstruction with the palm will give the greatest response, exceeding even the prolonged bone conduction resulting from any degree of lesion of the sound-conducting apparatus. When the examiner places his ear against that of the patient he converts the auditory canals of both into a closed cavity, so that both the patient and he hear the sound for the same duration of time and the same intensity, except in cases of perceptive deafness.

If the examiner hears the sound longer than the patient, allowing from three to five seconds for normal variations, the patient suffers from a lesion of the sound-perceiving apparatus, and the degree of involvement can be determined by the length of time he hears the sound longer than the patient.

The advantages of this test over the Schwabach test are that it overcomes the unreliable factor of the patient's response and checks the patient in differentiating between sound and vibration. It eliminates consideration of the better ear by increasing the bone conduction in the ear to be tested twice or three times, making the normal ear a negligible factor. If the sound is not lateralized under these conditions, this evidence in itself discloses involvement of the sound-perceiving apparatus in the tested ear. The differences in the hearing time due to differences in structure and composition between the skull of the patient and that of the examiner do not enter in this test. Differences due to variations in placement of the fork need not be considered, as the fork is held in one place throughout the test. No time is lost in the transfer of the fork from one mastoid to the other. Vibrations are usually not mistaken for sound with low pitched forks owing to the increased intensity of the vibrations in the obstructed ear. The prolongation of the sound gives the examiner ample time for proper observation and comparisons. "It enables the examiner to hear the same sound under the same set of conditions simultaneously with the patient."

This is probably a good method, but the properly performed Schwabach test, with objective control instead of the examiner's head, gives adequate findings. One of us (R. S.) has repeatedly emphasized the idea of using one fork in testing a large series of persons with normal hearing and finding the average duration of hearing by bone conduction at various ages. One need only compare the patient's hearing with the average figure to see whether there is a decided diminution or prolongation in bone conduction.

It is generally believed that electrically produced sound is better for the Stenger test than that produced by tuning forks, because the tone can be as continuous as desired, without decrement as with tuning forks.[10] Hinsberg uses reproduced speech instead of plain sound. Recent experience with a malingerer who refused to cooperate brought to light some of the inadequacies of the test. The Stenger test for the simulation of total unilateral deafness is based on the masking of sound in the good ear by the alleged deaf ear. If one ear is very deaf and the other moderately so or normal, sound will be referred to the worse ear when the intensity on that side is increased above the difference; e. g., if the left ear is one hundred times as deaf as the right, increasing the intensity more than one hundred times in the left ear over the right will cause the sound to be localized in the left ear. This difference in perception also varies in accordance with the source of sound production, whether it is a fork, an electrical device in the ear or a loud speaker. Speech is not so useful as simple tones, as the threshold for speech varies according to the variable formants and in general is higher than the real theshold for simple tones. It is also possible for the person with tone islands insufficient for perception of speech to be thought a malingerer with the Stenger test if tones are used for which he happens to have hearing. On the other hand, a person who is severely but not totally deaf on one side may simulate total unilateral deafness without being discovered.

The author suggests a test using the oto-audion. The good ear is tested with pitches from c to c-5. The deaf ear is measured for the same pitches as those carried over to the good ear. There is a constant ratio for the different pitches which cannot be learned well enough to be simulated.

In masking the good ear, it seems to be necessary to increase the intensity a hundredfold. As a matter of fact, since the intensity of sound varies inversely as the square of the distance, it is possible with forks to get a very considerable increase within a radius of from 6 to 8 inches (15 to 20 cm.).

Russell[11] presents the tests and their modifications for detecting simulated deafness. One must be careful in differentiating the hysterical patient who believes he is deaf, the malingerer who knows he is not deaf and the stupid, ignorant person who responds slowly or incorrectly, from the truly deaf person. Bilateral simulated deafness is more difficult to detect than unilateral simulated deafness. The patient's reactions should be carefully observed.

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10. Langenbeck, Bernhard: What Is the Significance of the Stenger Test? Ztschr. f. Hals-, Nasen- u. Ohrenh. **34**:250, 1933.

11. Russell, R. D.: Detection of Simulated Deafness, Laryngoscope **44**:201 (March) 1934.

The malingerer is frequently antagonistic to the examiner and makes exaggerated attempts to hear. Occasionally he may be detected by his responding to ordinary commands at a normal hearing distance but failing to respond to the voice tests at a much closer range. The person with bilateral deafness responds to tactile impressions, whereas the schooled malingerer usually does not. A modification of the Lombard test for bilateral deafness is very satisfatory. This consists of sounding a Bárány noise apparatus in both ears while the patient is reading; if he elevates his voice he is simulating. Variations of the voice and conversational tests are mentioned, such as several persons speaking to the patient at one time, covering the lips with the hand or rubbing one's nose so as not to disclose the procedure, or speaking to the patient in the dark room while carrying on transillumination.

In cases of unilateral deafness the wax-plugged ear speculum test can be used. Two specula are unplugged and two are plugged, and these are interchanged to confuse the potential malingerer. Similar tests are mentioned in which atomizer tips, the stethoscope and tests devised by Becker are used (which were reported on in our reviews during the past few years). A patient with only unilateral deafness who claims he does not hear when spoken to loudly at a close range when the normal ear is plugged with the finger is not truthful, for he should be able to hear with the normal ear. Various tests with the watch, coins and Bárány apparatus are described.

The Stenger, Wells and Clumani-Moos tests and the cochleopalpebral test of Gault are described. The caloric tests do not in themselves give proof of deafness. However, if the responses are markedly diminished or absent, the finding substantiates to a great extent a patient's claim of impairment or loss of hearing in that ear. The caloric test has some value in suspending the cochlear function of one ear while the other is being tested.

Russell emphasizes the importance of not letting the malingerer know by either act or word in what manner he was detected, for the intelligent simulator learns something every time he is tested, making his detection more difficult for the next examiner. Also, the examiner should be careful not to label a patient a malingerer on mere suspicion. Once the diagnosis is made, the otologist should be well prepared to defend his opinion on the witness stand.

Charschak [12] shows that it is difficult to exclude sound from the admittedly hearing ear when testing for simulated unilateral deafness. Various devices have been perfected from time to time to exclude sound from the opposite ear, such as the Bárány noise apparatus and the Neumann electrical noise apparatus; the former, however, masks a

12. Charschak, Eugen: The Determination of Unilateral Deafness, Monatschr. f. Ohrenh. **68**:34 (Jan.) 1934.

small residue of hearing which may be present in the opposite ear. The author offers a good explanation, namely, that a sound in either ear causes a reflex contraction of the intrinsic muscles of both ears. The increased intralabyrinthine pressure caused by the inward excursion of the footplate of the stapes may be sufficient to obliterate some of the hearing. This reaction must be exerted through the cortical center, or at least through some supranuclear center, and can be used as a control in the detection of the feigning of unilateral deafness.

When a noise apparatus is inserted snugly in the alleged deaf ear with the rubber tubing attached to the apparatus, there will be masking to some extent of the hearing in the good ear if there is any hearing in the alleged deaf ear. The author also recommends a simplified noise apparatus in the form of a piece of parchment laid against the auricle and scratched on by the finger-nail. Lorente de Nó has excellently demonstrated contractions of the tensor tympani and stapedius muscles in the rabbit when subjected to sounds. After exposure of the middle ear, these muscle movements can be easily observed with a magnifying glass, and by connecting the tendons of these muscles with a lever system curves are obtained. With an ingeniously arranged apparatus consisting of a series of mirrors, electrical equipment, etc., measurements of the acuity of hearing for various pitches were obtained by Lorente de Nó.

While the modification suggested by Charschak may be good, the properly used Stenger test (regarding which one of us [R. S.] has written in several previous reviews) is in many ways the best test for uncovering simulated unilateral deafness. Dr. W. A. Wells of Washington some years ago (which fact has also been noted in these reviews) suggested the use of one fork instead of two as in the original Stenger test.

Becker [13] presents a test for simulated unilateral deafness which utilizes both bone and air conduction simultaneously. Rubber tubing about 30 inches (76 cm.) long with a lumen about ¼ inch (0.6 cm.) in diameter is used. An olive-shaped ear tip is placed in one end, and the other free end is folded on itself about 1 inch from the opening and secured in this position with a rubber band. This loop is of sufficient size to permit the stem of the fork to enter it readily without exerting too much pressure on the walls of the tube. It is important that the distal end of the tube be tightly closed so that none of the sound will pass outward. It is also essential that the lumen proximal to the fork, the part leading to the ear, be not too greatly compressed. Any standard tuning fork of from 128 to 512 double vibrations may be used. The principle of the test depends on the fact that air conduction is greater than bone conduction and that conduction with this tube is

13. Becker, B. M.: A Combined Air and Bone Conduction Test for Pretended Deafness, Arch. Otolaryng. **20**:214 (Aug.) 1934.

slightly greater than that by air alone, making the difference between bone and tube conduction greater than normal. When both are tested at the same time the hearing by tube conduction will completely mask the sounds heard by bone conduction.

The test is performed after examination and complete functional hearing tests have been made. The unaffected ear is first tested. The examiner stands behind the patient. Bone conduction for this ear is first determined by placing the vibrating fork over the mastoid. Air conduction is then tested for this ear by placing the olive-shaped ear tip in the canal of the ear and then exciting the tuning fork, which has its stem in the loop of the other end of the tube. The respective readings are noted. For the responses the patient is told to raise his finger on the side on which he perceives the sound and to drop it when the sound is no longer heard.

The test proper is then applied to the affected ear. The olive-shaped tip is inserted in the ear, and the stem of the vibrating fork held in the loop of the other end of the tube is placed on the opposite mastoid (normal ear) and the patient's responses are noted. The air conduction in the so-called affected ear masking the bone conduction of the normal ear will entirely confuse the patient. If he states that he hears the sound in the bad ear, he exposes himself immediately. If he states that he hears it in the normal ear, as he does not because of the masking, the length of time he hears the sound is noted. Since an accurate reading for bone conduction has been obtained for that ear, it must coincide fairly accurately and repeatedly. This will not occur with the malingerer. If the patient is actually deaf, these readings will confirm it. To check the test, two forks of the same pitch and timing are used. A vibrating fork is placed on the rubber tubing leading to the "affected" ear, and a still fork held through the loop is placed on the opposite mastoid. The malingerer, feeling the pressure of the fork on the mastoid, will state that he hears the still fork in that ear, whereas the actually deaf person will state that he hears nothing. This is a simple test for the examiner but very confusing and complicated to the malingerer.

Firestone [14] describes a test for simulated deafness which combines both bone and air conduction applied simultaneously to the supposedly impaired ear, while at the same time the unimpaired ear is tested for air conduction alone with a synchronously vibrating tuning fork. The rationale for this procedure is that the intensity of the vibrations produced by the combined bone and air conduction in the alleged impaired ear is so great as to render the patient unable to localize vibrations perceived in the good ear from a synchronous tuning fork through air conduction only.

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14. Firestone, Charles: A Test for Simulation of Deafness, Laryngoscope **44:** 211 (March) 1934.

The technic of the test is first to perform the routine functional tests for both ears. Synchronous tuning forks with spherical tip handles ranging from C-64 to C-1,024 and A-440 are employed. The patient is seated on a stool, and an occlusion bandage is applied to both eyes. The examiner stands behind the patient. The test is usually begun with the C-64 synchronous tuning forks. Both tuning forks are stimulated equally at the same time, and the handle of one is gently pressed against the posterior wall of the external canal of the alleged deaf ear. The good ear is then tested for air conduction with the other synchronously vibrating tuning fork. The so-called impaired ear, receiving sound waves by both air and bone conduction, if perceived, will mask the vibrations being received by the good ear via air conduction alone. The malingerer, believing that only his injured ear is being tested, will deny hearing any vibrations, whereas the actually deaf person will hear vibrations in his unimpaired ear. To substantiate the diagnosis of malingering further, the vibrations of the fork held to the alleged deaf ear can be stopped, the tuning fork being kept in its original position. The malingerer will now perceive in his so-called unimpaired ear the same vibrations that he would have heard before were he actually deaf. These tests disclose the gross malingerer.

For the person who has a small amount of impairment of the middle ear but contends that he is totally deaf, a more complete test is done. This person claims that he hears nothing with the impaired ear but hears the vibration of all the forks with his good ear. The test is done with successive pitches starting with C-64 until the pitch is reached that is perceived by both air and bone conduction in the so-called impaired ear. When this occurs the patient will be unable to localize the vibrations in the unimpaired ear heard by air conduction from a synchronously vibrating tuning fork because he perceives in the injured ear similar vibrations by both air and bone conduction. He will either deny hearing the vibrations or give confused responses.

In those cases in which there is complete unilateral deafness, the vibrations of both bone and air conduction are not perceived in the deaf ear but may accentuate those reaching the good ear by air conduction. The patient will state that he hears the regular vibrating tuning fork in his unimpaired ear and may assert when the other fork is applied to the deaf ear that his perception is accentuated in the good ear.

This test, therefore, helps to disclose the total malingerer, the partial malingerer and the person with unilateral deafness.

Firestone claims that this test is more than a revision of the Stenger test. He claims that with the Stenger test the patient, especially the malingerer, develops a keen threshold for localization and so becomes aware of removal of the tuning fork from the unimpaired ear and will state that he no longer hears the vibrations even though he actually

does hear them with the so-called impaired ear. In his test, the vibrations in the good ear are never perceived, and the patient cannot localize the sound. In cases of unilateral nerve deafness in which the labyrinthine reaction is not completely corroborative, the bone conduction from the vibrating fork applied to the impaired ear will reenforce the air conduction produced by a synchronous tuning fork applied to the good ear, permitting an ultimate acknowledgement of the perception in the good ear. This test can be made with a wide range of tuning forks, making possible a more accurate determination. It provides one to a certain extent with a means for direct computation of percentage loss of hearing in a given case. It also affords a means of comparing the duration of air conduction in the injured ear with that in the good ear.

The modifications suggested by Charschak may be good, and the combined air and bone conduction test presented by Becker is ingenious, but we still believe that the Stenger test as it is usually performed, or the Wells modification thereof, is sufficient for all practical purposes. One of us (R. S.) has, on several occasions, discussed the Stenger test in these reviews (January 1925, 1927, 1928, 1929, 1930 and 1933). The following quotation appeared in the review of January 1925 in the ARCHIVES OF OTOLARYNGOLOGY:

> We have always felt that the Stenger test was a most valuable one, and has for the most part been given scant attention by otologists and by writers of textbooks, and we are therefore glad that Czubak has called our attention to it again. We are inclined to believe, however, that it is not necessary to make the test as complicated as he has done. It is our experience that when performed in the ordinary way as laid down by Stenger (with the patient blindfolded and thus not knowing that two forks are being used), it is possible to discover any case of simulated total unilateral deafness. Not knowing that the fork is vibrating at a greater distance from the admittedly well ear than it is from the supposedly deaf one, he is bound to give false answers. He dare not admit that he hears the intense sound in the supposedly deaf ear because then he admits his own malingering, and since the sound that is going into the supposedly deaf ear is drowning that being produced at equal distances from the supposedly well ear, at which distance he has previously admitted having heard the fork, he will probably say that he does not hear any sound at all. This fact alone at once establishes the fact that he is falsifying. In July 1923 W. A. Wells published a very simple and practical modification of the Stenger test, wherein he inserted the tuning fork into a piece of rubber tubing, connected it with the ear that was supposedly deaf, and then carried the fork by means of tubing over the head to the opposite ear within the distance at which the patient previously admitted hearing in his well ear.

Modifications of tests are welcomed, and men like the authors whose articles we have reviewed are commended for their earnest efforts to improve the tests. From the practical standpoint, however, we believe that the Stenger test or the Wells modification thereof will answer all purposes in the unmasking of simulated unilateral deafness. Even the

normal person who knows about the principles of the test, if he is blindfolded, cannot tell whether one or two forks are being used. If the fork is held closer to the right ear than to the left, he hears only the sound in the right ear and cannot know whether a fork at a greater distance is vibrating in the direction of the left ear.

In an article by one of us (R. S.)[15] the fundamental principles of the standard tuning fork tests are summarized and the new types of tuning forks and sounding rods developed in the last few years are described. The following conclusions are made:

Although the voice cannot be standardized by using an unaccentuated whisper and unaccentuated conversation with proper precautions, a practical estimate of hearing ability is obtained. This, with the history and general observation of the patient, the Weber, Schwabach and Rinne tests and examination of the ear, nose, nasopharynx and pharynx, enables one to make a diagnosis. With various audiometers, graphs are obtained, and the loss of hearing figured in sensation units is noted. This may also be done with tuning forks when the constant of damping is supplied. Recently a complete series of forks made of magnesium-aluminum alloy has been perfected. These forks are rust proof and tarnish proof, very light and cheaper than the best imported steel forks. Sounding rods made of the same alloy range from *c*5 (4,096 double vibrations) upward. The *c*5 and *c*6 rods vibrate much longer than the best steel forks of the same pitches. They are very valuable for detecting early changes in the auditory nerve.

180 North Michigan Avenue.

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15. Sonnenschein, Robert: Fundamental Principles of Functional Hearing Tests and Recent Developments in Tuning Forks and Rods, Arch. Otolaryng. **17**:599 (Oct.) 1933.

Clinical Notes

NEW INSTRUMENTS FOR IRRIGATING ANTRUMS THROUGH THE MIDDLE MEATUS

R. G. Reaves, M.D., Knoxville, Tenn.

For the past fourteen years I have used instruments somewhat more crude than those to be described, but I have found them satisfactory. Since much interest has been aroused lately in this method of treatment I decided to have the instruments improved and made available to the medical profession. The instruments [1] consist of an antrum probe and cannula. The probe is used to find any available opening, whether natural or accessory, in the middle meatus. The flat thumb-piece of the probe is taken between the thumb and forefinger, and is held gently while running the semidull point along in the middle meatus. It will usually drop into

Fig. 1.—Probe for finding the opening in the middle meatus or to puncture through the pars membranacea.

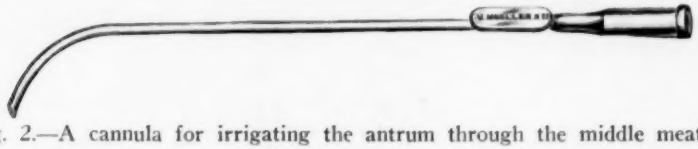

Fig. 2.—A cannula for irrigating the antrum through the middle meatus.

an opening. If not, the point is brought along the upper border of the inferior turbinate and forward to the region of the pars membranacea. The point is directed slightly downward, and pressure is made. If the point is on the pars membranacea the membrane will be felt to give, in which case a little more pressure will force the probe through. The opening should be stretched by moving the probe in every direction and the cannula then inserted. The advantage of the probe is the delicate sense of touch imparted through the method of holding the thumb-piece. It is easy to tell on making slight pressure whether one is on the bone or on the membrane.

The cannula is made with a thumb-piece to give the sense of direction of the point. There is an opening which will receive the tip of a 1 or 2 ounce (28 or 56 Gm.) rubber bulb syringe, and a little deeper is a space which will receive a Luer syringe for injecting opaque oils. I do not advocate the route through the

Read before the Section on Laryngology, Otology and Rhinology at the Eighty-Fifth Annual Session of the American Medical Association, Cleveland, June 14, 1934.

1. These instruments are made by V. Mueller & Co., Chicago.

middle meatus for all cases, as it is difficult when the septum is closed, and may not be advisable if there is too much congestion and swelling in the middle meatus.

My method of irrigating the antrum is to use two 1 ounce rubber bulb syringes. One fills itself in the solution while the other is being used to irrigate. The bulb is held between the thumb and fingers; undue or sudden pressure is never used. If there is a free return flow, no damage can be done, but when it requires much pressure the antrum is blocked and should be washed with care, as otherwise fluid may enter the tissue. If it is easy to enter the inferior meatus and difficult to enter the middle meatus I use a straight needle, entering through the inferior meatus. I also choose this route when the frontal sinus is involved and a natural opening cannot be found. Washing through a natural opening or puncturing through the pars membranacea is, I should say, almost 100 per cent safe, as I have used the method several hundred times with satisfactory results.

422 West Cumberland Avenue.

ELECTROSURGICAL TECHNIC OF TONSILLECTOMY UNDER LOCAL ANESTHESIA

P. W. Malone, M.D., Big Spring, Texas

Since machines have been devised to step up an electric current to such high frequency, with undamped oscillations, that it possesses a cutting effect on living tissue, they have been used in various surgical procedures such as the removal of cancer of the breast, superficial growths and lesions of various types and tumors of the brain and especially in transurethral resection for hypertrophied prostates. Two years ago I saw the possibilities of this high frequency, undamped electric cutting current in tonsillectomies and devised, independent of outside sources, the technic presented here, which in my hands has proved superior to any other. In the literature are numerous reports of the removal of tonsils by electrocoagulation and by means of a snare to which is connected a diathermy current. However, I have been unable to learn of any one who has made use of the undamped electric cutting current in a technic similar to the one I describe here.

The following apparatus and instruments are necessary: a high frequency electric cutting machine developing an undamped current; a large indifferent electrode; a needle point electrode for dissecting the tonsil from its bed; a tonsil tenaculum; a suitable metal or hard rubber tongue depressor; a pillar retractor, and a syringe with needles suitable for injecting a local anesthetic about the tonsil.

METHOD

The method of securing local anesthesia is the same as for any local tonsillectomy. The tonsil is grasped by means of a tenaculum and lifted inward and forward. Then, using the needle point electrode with the electric cutting machine adjusted to produce an undamped cutting current, the pillars are dissected free from the capsule, the upper pole is dissected out, and the dissection is carried downward, staying close to the capsule of the tonsil until the lower pole and any adjacent lingual tonsil tissue are removed. Any bleeding occurring during the dissection can be checked promptly by switching the machine to a damped or coagulating current and touching the bleeding point.

COMMENT

The advantages of this technic are:

1. Operative and postoperative bleeding rarely occurs. I have seen only three patients who had postoperative hemorrhage. In these the bleeding occurred about the tenth day and was readily controlled by applying a caustic stick. In no case has there been any bleeding in the first forty-eight hours.

2. Dissection of the tonsil can be carried out under direct view with no blood to obscure the operative field. This eliminates the possibility of damage to the pillars and the tissues of the sinus tonsillaris.

3. Although postoperative discomfort and time of healing are about the same as with other technics, there is less scar tissue, and certainly the throat looks smoother and cleaner than with any other method I have seen.

Petroleum Building.

THERAPEUTIC TECHNIC FOR STAPHYLOLALIA

CHARLES H. VOELKER, M.A., COLUMBUS, OHIO

The American Society for the Study of Disorders of Speech has classed both cleft palate speech and short palate speech under uraniscolalia. The prefix *uranisco* really refers to the hard palate. As a result of this fact and since, from the point of view of prognosis and therapy, the clinical procedure differs considerably in uraniscolalia and staphylolalia, I believe that there should be some differentiation in nomenclature and shall here attempt to define the newer term.

Staphylolalia, or so-called short palate speech, is a disorder of speech and voice quality, a dyslalia, resulting from staphyloschisis, staphylectomy, certain cases of uraniscoplegia and in palatognathous conditions in which there has been palatorrhaphy without staphylorrhaphy, or uranostaphylorrhaphy or uranostaphyloplasty, when, in spite of postoperative therapeutics, the scar tissue renders the velum inactive as a part of the oronasopharyngeal sphincter.

In staphylolalia the patient is able to produce the nasals, i. e., the final sounds in ra*m*, ra*n* and ra*ng*. All other sounds are defective. The plosives (p, t, k, b, d and g) are entirely missing. In the case of the fricatives, most of the air passes through the nose, leaving the sounds either partially or completely unpronounced and largely obliterated by the nasal pneumofriction. The vowels and vowel-like consonants are distorted by nasality.

The technic for therapy is as follows:

For the sound (p), the patient should be induced to close his lips and open them suddenly without emitting sufficient breath to be felt when holding his hand no farther than 1 inch (2.54 cm.) from his lips and nose. This sound seems to result from only the quickness of the separation of the lips. (I am indebted to Prof. G. Oscar Russell for the correction of the [p]).

For (t), the patient should place the blade of the tongue against the alveolar ridge and jerk it down quickly, yet not feeling any breath from his nose or mouth on his fingers.

From the Speech and Hearing Clinic, Ohio State University.

For (k), the patient should place the body of his tongue against the hard palate or scarred palatal tissue and lower the tongue suddenly so as to produce the (k) sound, yet with no appreciable breath.

These three exercises can be practiced in such a way that there is no indication whatsoever of breath passing through the nasal cavities.

For (b), the patient should be instructed suddenly to open his lips and produce simultaneously a glottal plosive (much like a cough or the initial pre-sound of an accented German vowel). This sound can be reproduced with greater facility with a vowel (as can the following two exercises for [d] and [g]) as soon as the patient has learned the vowels.

For (d), the patient should be instructed simultaneously to produce a glottal plosive and release the blade of the tongue suddenly from the alveolar ridge.

For (g), the patient should simultaneously produce a glottal plosive and sharply release the body of the tongue from the roof of the mouth.

These six exercises on the plosives should be practiced until they can be produced without ostensible peculiarities being noted by the lip-reader or the ear.

For the vowel (i), as in machine or p*ee*p, the patient should be induced to hum until he can feel his nose and lips vibrate; then, while holding this quality or so-called voice placement, he should open his lips and say the vowel (i).[1] This is the exercise which one hears so many singers using to limber up and place their voices. The patient should easily be able to produce a good vowel in this way, since by limitation he is forced to maintain an open nasopharyngeal air passage practically similar to that which the student of voice has to cultivate by practice. The fact that the velar sphincter is open during the production of vowels has been definitely proved by Russell in his roentgen studies on eminent singers.[2]

The other vowels should be practiced in the same way, although they depart more and more from the esthetic criterion of quality of those taught by the teachers of voice, progressively, from (i) through (I) pip, (e) pape, (ɛ) pep, (æ) pap, (ɑ) pop, (ɔ) pawp, (o) pope, (ʌ) pup and (U) pull to (u) pool. That is, all these have the high reenforcement of overtones characteristic of (i), but nevertheless are unmistakable one for another and have absolutely no nasality. For example, (u) loses its hollow quality with few overtones and takes on a more open, so-called forward, brighter quality, rich in overtones. With practice, pleasant reproduction of the vowels in this voice placement becomes possible. The production of the vowels in this manner is common in America and not at all strange to us. In fact, it is the voice often used in the more noisy surroundings.

The yod, or (y) sound, can be taught as the vowel (i). The patient should be induced to practice (i——ɛ) y——ɛ.

The (l) and (r) sounds should be taught in the same manner as the vowels. In (l), the tip of the tongue may touch the alveolar ridge, and the body of the tongue may be slightly raised. In (r), the sides of the tongue may touch the alveolar ridge, and the tip may be lowered. In any case, these two sounds are taught by imitation of the sound.

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1. The symbols used for the speech sounds in this article are those of the International Phonetic Society's Research Alphabet, which are almost as generally used the world over by scientists as are the chemical symbols.

2. Russell, G. O.: Speech and Voice, New York, The Macmillan Company, 1931.

It was found that the so-called voice-placement faculties could be used on the fricative consonants, contrary to common belief. The same forward placement that was used in producing the vowels is again to be used. A psychologic catalyzer in maintaining this voice placement is the protruding of the mandible, which is often characteristic of patients with uraniscolalia in general when they are learning to blow. By this method of placement and imitation by trial and error, the patient can be taught the fricatives. A more successful clinical procedure is usually to teach the surd fricatives before the corresponding sonant ones, that is, to teach (f) before (v); (ʍ), as in *wh*en (merely a blowing through rounded lips), before (w); (s) before (z), and (ʃ), as in a*ss*ure, before (ʒ), as in azure. The articulation of the fricatives consists in the narrowing of the air passage, using different surfaces and placements of the organs. Some of the fricatives are whispered, and some are voiced, so that the following go in pairs in English: (ʍ) and (w), with rounded lips: (f) and (v), with the lower lip close to the upper teeth; (s) and (z), with the teeth close together and the tongue close behind, permitting only a narrow stream of air to pass between them; (ʃ) and (ʒ), which are similar to (s) and (z), except that the column of air is larger and the lips are protruded rather than retracted and widened, and ($^{x}_{o}$), the sounds in the words *th*igh and *th*y, which are formed with the tongue close to the teeth.

The (h) can be taught only by training the patient to produce aspirated forward-placed vowels.

The patient should be instructed to produce all these sounds separately until they are completely learned and only then combine them into nonsense monosyllables, words and finally sentences and conversation.

PNEUMONIC OTITIS MEDIA

HARRY L. BAUM, M.D., DENVER

During the course of lobar pneumonia in children, it is not uncommon to encounter a form of otitis media which is decidedly characteristic. The onset of the symptoms is gradual and only in rare instances does the child complain of earache, the otitis being most frequently discovered by the pediatrician in his routine examination of the ears of a patient with pneumonia. The tympanic membrane, if seen early in the course of the otitis, is thickened and slightly pink, but rarely bulging. Later the pinkness fades and the membrane becomes white or pale yellow. The drum is still more thickened and appears to be bulging, but the landmarks in the region of Shrapnell's membrane are not always entirely obliterated.

The outstanding characteristics of the otitis media are the evident fulness of the tympanum, the paleness and thickening of the tympanic membrane and the absence of pain and inflammation. The condition rarely progresses to spontaneous rupture, although sometimes, but not invariably, a discharge follows incision. The discharge is rarely profuse and affords no relief to the patient, as evidenced either by the temperature or by the general condition.

I am inclined to believe that the pathologic picture is more that of an edematous than that of an inflammatory swelling of the mucous membrane lining the tympanum, giving a deceptive appearance of fulness which is suggestive of the

presence of pus. If an aural discharge is present, cultures usually show the same type of pneumococcus as that found in the sputum. Incision, as a rule, does no harm, but in view of the fact that it is usually of no benefit, even when followed by drainage, it seems wise to withhold it and watch the progress of the case until more definite indications are noted. Occasionally, the condition progresses until pneumococcic mastoiditis develops, but aural drainage does not seem to obviate the occurrence of such a complication.

Although I have not found any mention in the literature of the pneumonic type of otitis media, it is often discovered by the pediatrician and less often by the otologist. There is a question as to whether or not the otitis media is always properly evaluated, especially by the pediatrician, who is prone to feel that the complication is as serious as the usual forms of otitis so often encountered in cases of acute infections of the upper respiratory tract. In such cases the condition in the ear may quickly become the dominant factor, but the otitis media associated with pneumonia is probably only a local manifestation of a general disease, in itself not being highly important. Improvement is likely to be dependent on the development of a systemic immunity to the pneumococcus, resolution of the otitis taking place simultaneously with the resolution of the pulmonary process.

Abstracts from Current Literature

Ear

INVOLVEMENT OF THE EIGHTH NERVE IN SYPHILIS, WITH SPECIAL REFERENCE TO THE RESULTS OF TREATMENT. A. CIOCCO and A. WEINSTEIN, Am. J. M. Sc. **187**:100 (Jan.) 1934.

Of 286 syphilitic patients approximately 50 per cent were found to have normal hearing, the remainder being divided almost equally between those having excessive loss of high tones and those having subnormal hearing. Neurosyphilis was associated with involvement of the eighth nerve more often than were other types, but a diagnosis of neurosyphilis is not justified merely on the basis of impaired hearing in a syphilitic patient.

No relationship was found between treatment and the development of defects in hearing.

Except for deafness in early meningeal syphilis, treatment has no effect on the hearing.

JAMIESON, Detroit. [ARCH. DERMAT. & SYPH.]

CHRONIC SUPPURATIVE OTITIS MEDIA (OBSERVATIONS REGARDING ITS PREVENTION; THE EXAMINATION AND TREATMENT). JESSE W. DOWNEY JR., West Virginia M. J. **30**:97 (March) 1934.

Each case of chronic suppurative otitis media requires painstaking examination, careful classification and individual treatment.

Marked progress has been made in the prevention of this condition. Endeavors to build up the general resistance of susceptible children and careful and well thought out nasal treatments and operations undoubtedly reduce the number of attacks. Prompt and proper incision of the drum head in upper respiratory infections in children, especially in scarlatina, measles and influenza, has become a routine of inestimable value. Persistent purulent discharge after other symptoms have subsided is an indication for simple mastoidectomy in selected cases. Chronic discharge may continue for years without discomfort beyond the annoyance of the discharge, but it is a constant source of great danger of serious developments.

The author outlines his method of examination and presents the points that should be developed in the taking of histories and in examination.

This is an extensive and valuable article.

SHAWKEY, Charleston, W. Va. [AM. J. DIS. CHILD.]

TUBERCULOSIS OF THE EAR. DOUGLAS GUTHRIE, Tr. Edinburgh Med.-Chir. Soc., 1933, p. 169; in Edinburgh M. J., September 1933.

Guthrie states that tuberculosis of the ear has become much rarer within the past ten years. This form of suppuration of the middle ear is usually gradual and painless in development; the surrounding lymph glands are much enlarged. In about 50 per cent of the cases there is facial paralysis. A complete mastoidectomy must be done if one is to eradicate the disease. The general condition of the patient at this time determines the prognosis, which is not always hopeless. Guthrie showed a boy, aged 13 years, who had been operated on at the age of 5 months.

Dr. C. E. Scott presented a case in an infant, 7 months old, which might be mistaken for one of tuberculosis of the ear. The auricular glands were enlarged, softened and broken down, and there was facial paralysis, but the pus and granulations had shown Bacillus influenzae. A 2 year old child was presented, showing the healing stage after an operation for tuberculous mastoiditis. Logan Turner was reported to have said that suppuration of the middle ear in infants under 1 year of age is tuberculous in 50 per cent of the cases and possibly due to contaminated milk.

NEFF, Kansas City, Mo. [AM. J. DIS. CHILD.]

TREATMENT OF MASTOIDITIS. V. HINSBERG, Jahrb. f. Kinderh. **138**:233 (Feb.) 1933.

This article is a reply by an otologist to Zischinsky, who advocated expectant treatment for mastoiditis secondary to contagious diseases (*Jahrb. f. Kinderh.* **136**:310, 1932).

CLAUSEN, Rochester, N. Y. [AM. J. DIS. CHILD.]

OSSIFICATION OF THE AURICLE. A. PYTEL, Monatschr. f. Ohrenh. **68**:482 (April) 1934.

Pytel describes three cases of partial ossification of the auricle in men. In two of these the ossification was apparently connected with previous freezing, but in one the etiology remained unknown. The course of the ossification was that of a type of heterotopic bone formation. The diagnosis is not difficult if roentgenography is used. It is probable, however, that there are numerous cases of ossification passing under the diagnosis of perichondritis for want of a roentgenogram. In cases of ossification of part of the auricle the treatment by operative removal of the ossified portion is satisfactory. When the entire auricle is involved in a kind of osteoma, operative correction of the deformity is no longer possible.

EDITOR'S ABSTRACT.

THE VEGETATIVE NERVOUS SYSTEM AND THE VESTIBULAR APPARATUS. R. LEIDLER, Monatschr. f. Ohrenh. **68**:513 (May) 1934.

Leidler discusses the relations between the vegetative system and the vestibular apparatus. With regard to the nervous mechanism, in spite of many nuclear factors, it is apparent that there are special places in the central nervous system the nature of which is not known but which serve a vegetative function. The evidence tends to show that some of these, at least, are in the midbrain. The chemical mechanism is dependent on two main factors. The first is the substances dependent on the autonomic nervous system, consisting of hormones of internal secretion and tissue hormones. The second consists of substances which are independent of the autonomic nervous mechanism. It is, however, true that the nervous and chemical mechanisms work together. The regulation of temperature and of metabolism is dependent on this coordinated action. The antagonistic action of the parasympathetic system is also well recognized. In applying the knowledge of the action of these systems to the vestibular apparatus three sites of action come into consideration: (1) the nerve endings, which are affected by physostigmine, for example; (2) an intermediary organ which is inserted between the first and the third (epinephrine, atropine and pilocarpine act on this region), and (3) the cell substance itself. This description cannot, however, be considered as topographic. The receptive substance (muscle fiber, for example) is not stopped locally but is diffusely expanded as a constituent part of the fiber. Whether a sympathetic or a parasympathetic effect develops depends, perhaps, in the last analysis, on the distribution of calcium and potassium ions in the cell colloids.

EDITOR'S ABSTRACT.

MÉNIÈRE'S SYMPTOM COMPLEX AFTER THROMBOSIS OF THE BASAL CEREBRAL ARTERY: I. HOFER, Monatschr. f. Ohrenh. **68**:533 (May) 1934.

Hofer describes the case of a 65 year old woman with Ménière's disease based on a definite organic condition. For three weeks previous to her examination she had dizzy attacks while walking. She had vomiting, double vision on looking to the left and headaches. The hammering in the right ear of which the patient complained, in the presence of normal findings in the ear on examination, was considered to be due to disturbance of circulation in the arteries of the inner ear. It was determined at the first examination that the left inner ear was not impaired since the patient could hear and responded to the caloric test. On the following day the spontaneous nystagmus to the right was less marked, the hearing distance

remained the same and the vertigo was somewhat better. On the fourth day death occurred suddenly. Necropsy revealed a thrombosis of the basal cerebral artery which reached from 3 to 5 mm. into the fourth ventricle. Owing to the circulatory disturbance death resulted from the encephalomalacic focus in the fourth ventricle. The Ménière syndrome apparently resulted from anemia of the labyrinth on an arteriosclerotic basis followed by the thrombosis. EDITOR'S ABSTRACT.

MICROSCOPIC DEMONSTRATION OF THE OCCURRENCE OF SPONTANEOUS PERFORATION IN THE REGION OF SHRAPNELL'S MEMBRANE IN ACUTE OTITIS. W. BROCK, Ztschr. f. Hals-, Nasen- u. Ohrenh. **35**:439 (April 6) 1934.

Spontaneous perforation of Shrapnell's membrane in acute otitis has not previously been described. In the two cases discussed by Brock, this was established by histologic examination. In the first case sudden severe meningitis developed following acute otitis of about six weeks' duration with typical symptoms of empyema. Death resulted in a short time. The route of infection from the middle ear to the endocranium was established neither by a terminal operation nor by necropsy. Finally microscopic examination of the temporal bone revealed a purulent process in the apex of the pyramid. A further interesting finding was a sacklike protrusion of Shrapnell's membrane with a puncture-like perforation at the point of greatest protrusion. This opening led to a short penetrating canal lined with cylindric epithelium which discharged into the lumen of Prussak's space.

In the second case fatal fulminant meningitis developed after only five days of acute otitis. Here again the route followed by the infection was clarified only by microscopic examination. The infection passed from the tubular cells along Volkmann's canals to the carotid canal and there suppurated. In this case, as in the former, a protrusion of Shrapnell's membrane was found, but there was no perforation at this point.

Of forty-six cases in which microscopic examination was made, spontaneous perforation in the region of Shrapnell's membrane was observed in these two only (about 4 per cent). From an anatomic standpoint, in the first case there was extensive pneumatization with especially good development of the labyrinthine cells. In the second case there was definite inhibition of pneumatization.

EDITOR'S ABSTRACT.

FUNCTIONAL RESULTS OF RADICAL OPERATION. H. ZUMBROICH and P. KOCH, Ztschr. f. Hals-, Nasen- u. Ohrenh. **35**:457 (April 6) 1934.

Zumbroich and Koch studied the functional results as to hearing in the cases of twenty-five patients who had undergone radical operations for uncomplicated inflammations of the middle ear. They were classified into three groups. In sixteen cases (60 per cent) the hearing was improved, in five (20 per cent) it was worse and in four (16 per cent) it was unchanged. In the first group whispered speech was heard on the average from 30 to 35 cm. farther, the distance varying from 5 cm. to 1 meter. In only two, however, was the hearing of upper and lower tones improved parallel to whispered speech. In the five cases in which hearing was diminished after the operation, whispered voice was heard, on the average, 24 cm. closer. Hearing for the upper and lower tones was poorer in three cases, unchanged in one and improved in one. In the third group, in which hearing was unchanged, perception of whispered speech was absent or doubtful before the operation and remained so afterward. In two of these four cases hearing of lower and upper tones was improved after the operation, and in two these tones were harder to perceive.

EDITOR'S ABSTRACT.

FISTULA SYMPTOMS. L. TRÜBSBACH, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **25**:94, 1934.

Trübsbach states that there are two possible ways by which a fistula in the labyrinth may lead to so-called fistula symptoms, namely, movement of the lymph and direct irritation of the nerves themselves. That movement of the lymph in the semicircular canals is a definite cause of the development of nystagmus is certain and is easily ascertained experimentally. If, however, in a patient with fistula symptoms the caloric response remains normal, one is in general correct in assuming that the lymph circulation is still intact in spite of a bony defect in the labyrinthine wall. On the other hand, there are cases in which the membranous labyrinth is disturbed so that lymph circulation with movement of the cupula can no longer take place and in which definite eye movements are observed. In these cases the caloric test is always negative. The excitation of the nystagmus in these cases is directly due to the granulations with which the canals are filled. That the irritation is induced by the granulations may be shown in certain cases with wide fistulas. Thus, in an opened middle ear, if one carefully passes a fine sound from the front to the back of the fistula, the direction of the nystagmus is opposite to that obtained when the sound is pulled from behind forward. In a large number of cases, however, the typical fistula symptom with nystagmus to the same side with compression and to the opposite side by aspiration does not occur, and the direction of the nystagmus is the reverse. Numerous other combinations may also occur. The changed fistula symptoms with the same irritation in different strengths is easy to explain. On weak pressure a normal fistula symptom is produced, while the injured nerve endings are still above the threshold of response; on strong pressure they will no longer respond because of the developed paralysis. The author cites cases showing various types of fistula symptoms, including some in which there had been no fistula symptoms before the operation and such symptoms developed only after complete operative healing. Finally, he briefly describes an unusual case of vertical nystagmus.

EDITOR'S ABSTRACT.

Pharynx

A HEMORRHAGIC ERUPTION OF THE MOUTH AND THROAT IN THE RHEUMATIC STATE. E. HOLTZ and G. FRIEDMAN, Am. J. M. Sc. **187**:359 (March) 1934.

The writers describe a transitory, deep red eruption which occurs and recurs on the mucous membrane of the mouth and throat, chiefly in cases of chronic rheumatic endocarditis.

The lesions are small, circular and nonelevated; one or several may be present; they are most frequently seen on the buccal mucosa and vary from the size of a pinpoint to 2 mm. in diameter. They vary in color from the crimson of fresh hemorrhage but may be darker or bluish. The duration is brief, the lesions often disappearing or fading considerably in twenty-four hours and being succeeded by a new crop.

The authors regard the eruption as a nonembolic, hemorrhagic exanthem.

JAMIESON, Detroit. [ARCH. DERMAT. & SYPH.]

CONSERVATIVE TREATMENT OF CHRONIC TONSILLITIS. G. E. JANNULIS, Monatschr. f. Ohrenh. **68**:612 (May) 1934.

Jannulis lays especial weight on the significance in the diagnosis of chronic tonsillitis of the objective sign of sensitiveness of the tonsillar niche to pressure obtained by palpation from outside. This sign can sometimes be made to disappear by employing conservative treatment instead of tonsillectomy. His conservative method involves massage and irrigation of the tonsillar crypts with methyl violet and collargol. The massage involves the buccinator, buccopharyngeal, glossopalatine, stylopharyngeal, glossopharyngeal, styloglossal, levator veli palatini, tensor veli palatini, pharyngopalatine, salpingopalatine, and internal pterygoid muscles.

In a patient with chronic tonsillitis whose case is described in detail the local symptoms and the general symptoms of lack of appetite, poor general condition and disturbed sleep were improved by this conservative method of treatment. The erythrocyte count increased from 3,600,000 to 4,600,000, and the percentage of neutrophilic leukocytes increased from 50.5 to 60.

EDITOR'S ABSTRACT.

FATTY DEGENERATION OF EPITHELIAL CELLS IN TONSILLAR CRYPTS. S. KROMPECHER and J. NÉMAI, Monatschr. f. Ohrenh. **68**:641 (June) 1934.

Krompecher and Némai state that epithelial cells may exhibit fatty degeneration in the lacunae of the tonsils. Histologic examination with especial attention to the results of fat staining showed that the epithelium in the depth of tonsillar lacunae acts similarly to the epithelium in the preputial sac. The surface of the tonsils facing the oral cavity is covered with thick, nonkeratinized stratified pavement epithelium which also has as a basis a firm layer of connective tissue. This corresponds to the mechanical function of the organ. The epithelium of the walls of the lacunae is considerably thin; the margin of the connective tissue is missing; the follicles come straight up to the surface; the epithelial layer is invaded by lymphocytes, and if the fossa is deep and cut off from the air (favorable average condition similar to that in the depth of the sebaceous gland), the epithelium shows fatty degeneration. This observation permits a contribution to the knowledge of fatty stratified pavement epithelium. Macrophages infiltrated by accumulations of fat were found regularly in the parenchyma, in the epithelium and also in the content of the fossa (detritus). The physiologic detritus in the tonsillar fossa is built up from exfoliated epithelial layers which undergo fatty degeneration and from accumulations of lymphocytes. There are also to be found a number of leukocytes, plasma cells, macrophages and bacteria. Occasionally the condition results in a concrement formation. A concrement may be studied in its architecture and suggests calcium composition.

EDITOR'S ABSTRACT.

Larynx

THE PROTRACTED-FRACTIONAL X-RAY METHOD (COUTARD) IN THE TREATMENT OF CANCER OF THE LARYNX. J. H. D. WEBSTER, J. Laryng. & Otol. **49**:429 (July) 1934.

Webster cites the disadvantages of most methods of roentgen treatment of laryngeal cancer. He states that the only method which can show convincingly good results after long periods of years is that of Coutard. Its value has recently been confirmed by the results of a number of other radiologists, for example, Schinz, Kahlstorf, Zuppinger, Stewart-Harrison and Holthusen. For an intrinsic laryngeal cancer of the mucosa type or when there is little or no differentiation, Coutard's treatment is the treatment of choice. In cancer of the true cord of the skin type, Coutard's method is to be recommended when the cord is still movable; but if the growth is of the skin type and is more extensive, operative measures are to be recommended, or a trial of Coutard's method. In all epilaryngeal cases Schinz recommends Coutard's method as that of choice. Coutard's lowering of the roentgen per minute intensity has made the total dose which can safely be given rise steeply.

The five essentials in Coutard's method of treatment are summarized as follows: 1. One uses high voltages (180 or 190 kilovolts), a filter of from 1.5 to 2 mm. of copper or zinc, a focal skin distance of 50 or more centimeters and two directly opposing lateral fields, with or without supplementary fields on the affected side in the case of extensive pharyngeal growths, for patients with marked adenopathy or for patients with thick necks. 2. Each dose must be protracted, i. e., must have a low minute intensity as compared with that used in ordinary roentgen treatment. Coutard's choice of degree of protraction gives doses per minute which are from ten to twenty times weaker than the doses given by the usual methods. 3. The doses are highly fractionated as compared with those of other fractional methods.

Thus at least two daily doses are given, for example, one for an hour in the morning and one for half an hour in the afternoon, with the exception of Sunday; and the doses are divided so that the course lasts from two to four or more weeks. 4. An extraordinary high total dosage is administered and regarded as necessary as compared with most other methods: On the surface a total of from ten to twenty times the mild erythema dose may be given. 5. The dose must be estimated beforehand carefully for each patient, and then it must be controlled by accurate measurement of the Holzknecht units or, as later used, the roentgens, and further and most essentially, controlled by the appearance in the pharynx and larynx of the white fibrinous mucosal reaction and by the appearance on the skin of an epidermitis. It is easy to give a total dose of 7,000 roentgens for an epithelioma of the mucosal type, but for an epithelioma of lesser sensitivity (skin type) it is difficult to reach a total dose of 90 Holzknecht units or 9,000 roentgens without exceptional care in the technic and administration. When Coutard's doses have reached more than 10,000 roentgens, as a rule there has not been a cure and damage has resulted. The author concludes that for squamous cell carcinoma of the larynx, for pharyngeal, tonsillar and probably some other squamous cell carcinomas and possibly for cancer in other sites and of other types, the Coutard method gives great promise for the future usefulness of the roentgen branch of radiation therapy.

EDITOR'S ABSTRACT.

FUNCTIONAL ARCHITECTURE OF LARYNGEAL CARTILAGE. E. BÜHLER, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **25**:135, 1934.

Bühler's preliminary paper describes one of a series of studies undertaken by the Marburg Otolaryngologic Clinic on the functional architecture of that part of the skeleton of chief interest to the otolaryngologist. His work is based primarily on the comparative anatomy of the larynx in the horse, ox, pig, dog, ape and human being. He found that the muscles in a purely cartilaginous laryngeal cartilage are attached not to hyaline cartilage but to perichondrium. The latter is not only anatomically but functionally a unit. Its lines of cleavage can be understood only on the basis of the functional unity of the entire skeleton. They follow the architectural principle of arising from the edges and radially from their apexes they bear outgoing lines of cleavage. The architecture of the hyaline cartilage crosses, as a rule, that of the perichondrium of the analogous site. Thus it appears that in a sense the function of the cartilage is the opposite of that of the perichondrium.

EDITOR'S ABSTRACT.

Nose

A STUDY OF THE SINUSES AND SINUSITIS IN INFANTS AND CHILDREN. CHARLES GILMORE KERLEY and EDWARD J. LORENZE JR., M. J. & Rec. **239**:213 (March 7) 1934.

In this study six hundred and seventy roentgenograms were taken, twenty-three of which were of new-born infants. Sinus disease in the child from a diagnostic point of view is different from that of the adult. The explanation for this is given. The authors paid special attention to the roentgenographic appearance of the normal sinuses at different ages of infancy and childhood, at what period of life the sinuses may be roentgenographically demonstrated, the roentgenographic appearance in sinus disease and the relation of sinusitis in children to bodily ailments. Among the patients under observation, 337 males and 310 females showed sinus disease. The location of the sinusitis and the disorders for which the children were under observation are enumerated. The management of the cases is described, and many roentgenograms of normal and diseased sinuses are presented.

WILLIAMSON, New Orleans. [AM. J. DIS. CHILD.]

AN ATTEMPT TO CLASSIFY THE DIFFERENT VARIETIES OF TEARING AND THE METHODS OF OCULONASAL SURGERY. H. TILLÉ, Bull. Soc. d'opht. de Paris, April 1934, p. 247.

The conclusions are as follows:

1. In a series of sixty-six patients with tearing the most important tears were those due to nasal defects, which are best treated by the rhinologist.

2. Tearing due to associated lesions of the lacrimal canal and the inferior meatus is cured in all cases in three weeks by the mixed treatment (one or two catheterizations, with or without associated stricturotomy and luxation of the inferior horn of the meatus). Exceptionally, it is necessary to remove the sac.

3. Tearing without apparent stenosis is much less frequent than other types. It is best treated by the injection of alcohol into the lacrimal nerve or diathermic coagulation of the lacrimal gland.

4. Tearing due to obstruction of the canal alone is cured by one or two catheterizations with a no. 2 or 3 sound.

5. For purulent dacryocystitis removal of the sac or the West operation is advised.

There is a discussion of the condition.

MAYER, Chicago. [ARCH. OPHTH.]

RELATION BETWEEN DACRYOCYSTITIS AND SINUS DISEASE. C. CODERO, Riv. oto-neuro-oftal. **9**:60 (Jan.-Feb.) 1934.

Seventy-eight cases of dacryocystitis were studied according to a definite plan of investigation, from which the following conclusions are drawn regarding etiology:

Frequent coexistence of inflammatory processes involving the lacrimal sac and paranasal sinuses is undeniable. Such was the case in 79 per cent of the patients: in 46 per cent it was certain, while in 33 per cent there was a strong probability. In general the sinuses were affected by a simple inflammatory process, more or less accentuated. Only rarely was free pus found in the nose, a sign of inflammation in a strict sense. The sinuses most often affected were the ethmoid, either separately (22 per cent) or together with the other periorbital cavities (51 per cent). When there was an associated polysinusitis, combinations of ethmoid-maxillary and ethmoid-sphenoid infection occurred. These were observed in 21 per cent of the cases of associated sinusitis.

Twenty-five cases carefully followed up seemed to show that acute or chronic dacryocystitis is often followed or accompanied by sinus disease. The author formulates the latter proposition merely as a hypothesis. In fact, in 80 per cent of the cases after extirpation of the sac the sinuses became markedly or completely clear in roentgenograms.

Sinus involvement is more frequent in acute or phlegmonous dacryocystitis than in the chronic forms.

SYRACUSE, New York. [ARCH. OPHTH.]

THE SYNDROME OF THE NASOCILIARY NERVE; REPORT OF TWO CASES. J. VERDAGUER and H. VON DESSAUER, Klin. Monatsbl. f. Augenh. **92**:513 (April) 1934.

The authors describe the anatomy of the nasociliary nerve and report several cases of a hitherto unrecorded oculonasal syndrome resembling in some instances the syndrome of the sphenopalatine ganglion reported by Charlin. The following triad of symptoms is typical for the nasociliary syndrome:

1. Inflammation of the anterior segment of the globe. This may occur in the shape of ulcerous keratitis with erosions or ulcers, cyclitis, several forms of iritis or conjunctivitis with a pseudopurulent abacterial secretion.

2. Neuritis with tenderness on touch in the course of the infratrochlear nerve and the external nasal branch, or with hyperesthetic or anesthetic zones in the skin, or with vesicles in the area of the cutaneous ramifications of the nasociliary

nerve. Vascular or secretory disturbances in the skin have been observed. The neuralgic pain is most acute in the eye, the orbit and the forehead.

3. One-sided rhinitis with abundant nasal discharge and severe swelling of the mucous lining in the anterior third of the nostril of the same side.

This syndrome should be considered in every case of pathologic changes of the anterior segment of the globe coupled with rhinitis. Recovery in cases of local origin is brought about within a few days by sufflating into the nose a powder containing cocaine and epinephrine. Ethmoidal sinusitis, if present, must be treated. Inefficiency of this therapy points to a general disease, such as diabetes or syphilis, which demands proper care.

STOLL, Cincinnati. [ARCH. OPHTH.]

TREATMENT OF CHRONIC SUPPURATION OF THE FRONTAL SINUSES WITH SOLUTION OF CALCIUM HYDROXIDE. H. KRAMM, Ztschr. f. Hals-, Nasen- u. Ohrenh. **35**:536 (May 15) 1934.

In about 90 per cent of the cases of chronic suppuration of the frontal sinuses in which free drainage is established and the sinus is later irrigated, healing results. When healing fails to occur in such a case, the question is what to do next. Kramm feels that boric acid powder is useless and perhaps even disadvantageous. The use of 10 drops of a 10 per cent solution of formaldehyde in 1 liter of water in the antrum proved harmful. Solution of calcium hydroxide is a watery solution of slaked lime, has an alkaline reaction, liquefies tenacious mucous secretion, loosens diphtheritic membranes, works on the mucosa, limits the secretion of abscesses and is drying and disinfectant. It seems to have a definite inhibiting action on the progress of inflammation. With this previously described conception of the function of solution of calcium hydroxide, the author studied its action for three months. He found that it must be diluted with distilled water since it is made turbid on warming with ordinary water. The undiluted solution is irritative to the nose and throat. The right dilution for use in treatment of the accessory sinuses is 1 part of solution of calcium hydroxide to from 3 to 6 parts of distilled water. The solution is warmed to body temperature in a water bath. It should be used once or twice weekly. In a patient who had had an unhealed chronic suppuration of the frontal sinuses for several years complete healing occurred with the use of this solution, previous irrigations with other medicaments having proved useless. While only 1 case is reported, the author recommends this conservative method of treatment for further observation.

EDITOR'S ABSTRACT.

ANATOMY OF THE HUMAN NOSE. H. RICHTER, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **25**:137, 1934.

In studying the anatomy of the human nose Richter had two objectives in mind. The first was to furnish every one with a sure understanding of the finer structure of the nose, and the second, to create a pictorial foundation, which is made easier by histopathologic observations in serial section. For this purpose he chose a human fetus of 30 cm. craniococcygeal length, from which an epithelial model was made. Each section was 20 microns thick, embedded in pyroxylin and stained by the Mallory method. Ten frontal sections were made, the level of each being indicated in a reproduction of the epithelial model. The first showed the simple relations of the anterior portions of the two nasal cavities. The second passed through the head of the left maxilloturbinal at its widest point and the first portion of the middle concha. The third passed through the left middle concha at the widest portion of the head. The fourth extended on the left through the forward end of the upper concha and about the middle of the lower concha. The fifth was about half the depth of the nasal cavities and cut the upper concha at its widest point and the middle concha in the middle. The sixth showed no great changes from the fifth. The seventh extended on the left through the posterior end of three conchae but through the thickest point of the upper concha. The

eighth passed through the posterior ends of the four conchae of the left side. The ninth was slightly posterior to the eighth, but detailed description is omitted. The tenth and last section was made in the region of the choanae and sphenoid sinus. The author believes that observation of single sections gives inconclusive evidence in formulating an opinion as to the development of the nose. It is clear, also, that sections made at later ages will show definite changes from those described in this paper.

EDITOR'S ABSTRACT.

Miscellaneous

THE FINER STRUCTURE OF THE TEMPORAL BONE IN CHONDRODYSTROPHY. F. ALTMANN, Monatschr. f. Ohrenh. **68**:539 (May) 1934.

Altmann describes the histopathologic appearance of the temporal bone in 4 cases of chondrodystrophy. The first was that of a 24 cm. long male fetus born spontaneously in the eighth month. The second was that of a newly born mature female infant. The third was that of a female infant born about two weeks before term, and the fourth was that of a new-born child of unknown sex. On the basis of the histologic observations the author agrees with Nager and Meyer that there are two types of changes in the temporal bone in chondrodystrophy. The first, that of slight changes, consists solely of disturbances of the enchondral ossification and the corresponding low grade anomalies of the remaining primitive cartilage. In the second type, involving severe changes, marked disturbances of the enchondral ossification are found with a partial substitution of ossification of periosteal type richly filled with medullary cartilage. Marked anomalies of the primitive cartilage and a partial replacement of this by strands of twisted bone tissue are also found. Naturally, however, the line between these two types is not sharply drawn. In regard to the origin and nature of the chondrodystrophic bone changes, the author is of the opinion that one is dealing with a developmental disturbance of the cartilage-forming system, presumably on the basis of an inferiority of the cartilage itself. The parallelism between the appearance of the cartilage and the degree of ossification disturbance are corroboratory of this view.

EDITOR'S ABSTRACT.

THE PROBLEM OF SCLEROMA. S. BURACK, Monatschr. f. Ohrenh. **68**:647 (June) 1934.

Burack attributes great value to the morphologic-cultural, biochemical and especially serologic criteria for the diagnosis of scleroma but states that he is skeptical of results based solely on morphologic-cultural observations. Lack of significant histologic features does not necessarily exclude the diagnosis of scleroma. In many cases histologic examination reveals unsuspected scleroma. Only through continued histologic examination can the presence or absence of scleroma be determined. The author does not believe that a parallelism exists between the severity of the disease and the number of Mikulicz cells. He states that the increase in these cells in many instances does not correspond to the malignant course of the disease. He agrees with Szmurlo that the anatomopathologic investigations of scleroma are in their infancy. The condition is typified by a variability of symptoms, different forms being encountered even in the same part of the respiratory tract, for example, nodules, papules and papilloma-like excrescences and granulations on a more or less uniformly infiltrated basis, diffuse infiltrates, and individual nodules of the nose, the soft palate and the glottis. The author concludes, contrary to the opinion of Nowiczi, Streit and Szmurlo, that scleroma does not always begin in the nose in the form of an atrophic process.

EDITOR'S ABSTRACT.

MUCK'S EPINEPHRINE PROBE TEST IN CASES OF SKULL TRAUMA. E. BÜCH, Ztschr. f. Hals-, Nasen- u. Ohrenh. **35**:548 (May) 1934.

Büch compares and discusses the published reports of the use and value of Muck's epinephrine probe test. In the cases of skull trauma reported by nine

authors, an average positive result of the epinephrine probe test was reported in 68 per cent. In determining the percentage in which the outcome of the epinephrine probe test coincided with the side of the injury, an average of 65.9 per cent was obtained. The attempted localization to the involved side by the epinephrine probe test in cases of skull injury gave 85 per cent correct results for definite brain injury, 70 per cent for skull injury with postcommotional complications and 58 per cent for definite basal skull injury. The author concludes that this test must be considered as a valuable accessory diagnostic method even though it does not invariably give a sure diagnosis.

EDITOR'S ABSTRACT.

THE QUICKEST AND SIMPLEST METHOD OF DETERMINING THE ETIOLOGIC AGENT IN ACUTE INFECTIONS OF THE EAR AND UPPER RESPIRATORY TRACT. E. WIRTH, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **25**:104, 1934.

Wirth believes that culture of nasal scrapings on blood agar is the best method of establishing the etiologic agent of acute infections of the upper respiratory tract. Observations of the secretion of the middle ear, nasal scrapings, tonsillar scrapings and saliva showed that as a rule in the first days of an infection the nasal scrapings contained the causal organism of otitis in pure culture. Tonsillar and salivary cultures were far less satisfactory. Air-borne infections of the middle ear and accessory nasal sinuses hardly ever occur. The greater number of cases of acute otitis develop from an infection of the nasal mucosa. This applies to mucous otitis (Pneumococcus type III) also. With great probability the extension of the infection follows the continuity of mucosa through the tube. A condition of this extension is the formation of a definite infectious focus. The development of foci of infection of the nasal mucosa with hemolytic streptococci is increased by an operative procedure. The occurrence of postoperative otitis and angina is explained by extension of the mucosal infection from such an infectious focus.

EDITOR'S ABSTRACT.

PROGRESSIVE MALIGNANT GRANULOMA OF THE RESPIRATORY PASSAGES. O. VOSS, Ztschr. f. Laryng., Rhin., Otol. (Teil 1: Folia oto-laryng.) **25**:122, 1934.

Voss describes 2 patients in whom the most marked clinical symptoms were stenotic phenomena extending from the nose to the larynx. A diffuse mucosal proliferation of chronic inflammatory character was found to extend over the entire mucosa of the pharynx, larynx, trachea and bronchi. This tended toward gangrenous degeneration. In general, the illness progressed painlessly but ended fatally in both instances. From the available cases reported, the author feels that the clinical and pathologic picture described is best explained on the basis of a progressive malignant granuloma.

EDITOR'S ABSTRACT.

Society Transactions

AMERICAN LARYNGOLOGICAL ASSOCIATION

CHARLES J. IMPERATORI, M.D., *Abstract Editor*

Fifty-Sixth Annual Congress, Cleveland, June 7, 8 and 9, 1934

GEORGE M. COATES, M.D., *Acting President, in the Chair*

PRESIDENT'S ADDRESS. DR. GEORGE M. COATES, Philadelphia.

The American Laryngological Association is the oldest society in continuous existence, local or national, devoted to the study of diseases of the nose and throat. Its history has been always closely identified with all the progress made in the development of this specialty, and its transactions over a period of fifty-six years faithfully reflect the continuous advances made through the years. Because of this history and because membership is necessarily limited to those who have definite accomplishments to their credit, fellowship in this association is an honor to be striven for and, when obtained, to be cherished. Loyalty, friendship and good comradeship have ever been the attributes of the fellows, and many traditions have developed during the years.

The Casselberry prize has been given five times for meritorious work in research and the de Roaldes medal, three times to those who have contributed most to the development of the specialty. The recipients of the de Roaldes medal are Drs. Jackson, Delavan and Mosher, the last-mentioned having been awarded this distinction at the present meeting.

Fellows are urged to continue in these and other traditions and to help in the careful selection of younger men for associate and for active fellowship.

COLOR CHANGES IN THE NASAL MUCOUS MEMBRANE AS A GUIDE TO THE STATUS OF THE SYMPATHETIC AND PARASYMPATHETIC NERVOUS SYSTEMS. DR. D. C. JARVIS, Barre, Vt.

This article will appear in a later issue of the ARCHIVES.

DISCUSSION

DR. JOHN J. SHEA, Memphis, Tenn.: There are two buffer systems in the human body which work for the maintenance of balance; one of them prevents the blood cells of the endocrine system from coming out of balance, the other is recognized as the regulator of biochemical balance.

The buffer system for the regulation of biochemical balance must be taken into consideration when speaking of changes in the mucous membrane. The sodium and potassium salts maintain a normal biochemical balance in the body. The fluids of the body are composed of solutions of weak acids. When an acid is taken into the system, it immediately reacts with one of these salts to form a weaker acid and a neutral salt, so that the biochemical balance is not too greatly changed.

If a strong base is absorbed, it reacts with the weaker acid and unites with it to form a weaker base. By this process, the reactions of the tissue fluids are controlled.

Formerly, the internists spoke of acidosis and alkalosis. Today, of course, they have discarded the term "acidosis" because a neutral state of biochemical balance is never reached. A patient whose biochemical balance is as low as 73 p_H has a relative hypo-alkalinity, which is the equivalent of the state formerly called "acidosis."

When a patient is in a state of hyperalkalinity, the mucous membranes become pale, whereas those whose condition would formerly have been termed acid, or is really hypo-alkaline, always maintain a red type of membrane.

The chemical balance, in the case of the pale mucous membrane, is one of a deficiency in sodium and in chlorides. The summer cold is an indication of the condition.

In the South it was thought for years that if a Negro in the fields ate fat instead of fresh meat, he did not suffer from the sun. But it was not a question of whether he ate fat meat or fresh meat; he ate salt meat, and he got enough salt to replace that which he lost.

In many of the larger industries and certainly on the railroads, where men work in the open, it is required that extra salt be taken during the summer.

The red type of septum, of course, denotes a deficiency in potassium, calcium and iodine. Sodium and potassium regulate the nutritional balance, and calcium and iodine are antagonistic in their action.

The color of the mucous membrane, therefore, is based not altogether on the action of the sympathetic and parasympathetic systems but also on a biochemical system.

Dr. Ernest M. Seydell, Wichita, Kan.: "Vasoneurotic dialysis" is a term that has been coined abroad. Alfred Müller examined the capillaries of the body by means of the capillaroscope and found that in persons with vasoneurosis there is a dysneuria of the peripheral vascular system which promoted a spastic, atonic condition of the capillaries with increased permeability and a lack of uniformity in the anatomic structure; that is, the anterior portion of the capillaries was constricted and the venous portion dilated in vasoneurotic patients with pale septums. It was found consistently that in vasoneurotic and in allergic patients the reaction is acid, and that in normal persons it is alkaline.

Iodine causes a contraction of the capillaries and therefore changes the state of being.

Dr. Burt R. Shurly, Detroit: There is an interesting problem in connection with this paper, and that is the maintenance of a balance in the knowledge and information which is possessed regarding the ever-present relationship between internal medicine and the specialty of otolaryngology. Biochemical studies are offering more and more enlightenment.

Are some of the old truisms being forgotten? It has been well known throughout the thirty-nine years in which I have been looking at the septum that it is sometimes red and sometimes pale. But is the problem of the whole organism, which is a larger one than that of one organ, going to be pinned on just a few theoretical investigations?

The vasodilators and the vasoconstrictors are always present, and it is well known that beneath all of it is the problem of the endocrine system, which is exceedingly like a magnetic needle, changing from hour to hour and from day to day.

The point is: Are physicians going to be carried away by a few biochemical discoveries? Or will they combine theory and practice so that they remain level-headed and do not subject their patients to a hundred laboratory blood and chemical tests in order to determine why the mucous membrane is a little redder or a little paler?

It has been known for thirty-five years that if compound solution of iodine is given to a patient with hyperthyroidism the situation in the nose and throat, in the thyroid gland and in the body is improved.

Much more is known about the problem of the vitamins and yet one is still far afield in combining with this knowledge a practical and absolutely certain demonstration of the proper therapeutic procedure.

This study is exceedingly interesting and full of thought; it is of interest in that it stimulates the carrying on of more and more observations. In over-specialization, one forgets the great mechanism of the human body, which is working night and day and which is the ultimate criterion that must never be forgotten and always closely followed and watched.

I wish to refer to the old Shurly soup of thirty-five years ago—two tomatoes, two carrots, a bunch of celery, two potatoes and two beets, ground up and furnished as raw vegetable juice, containing all of the mineral salts and all of the vitamins, and still good today.

Dr. D. C. Jarvis, Barre, Vt.: Referring to the terms acidosis and alkalosis, I prefer two terms borrowed from dentistry, namely, acidemia and alkalemia. These terms indicate a tendency toward acidosis or alkalosis.

If it is true, as it seems, that color changes of the intramural mucous membrane may be considered an index of the autonomic level, preventive otolaryngology is in its infancy, for these changes in color make the artificial control of constitutional conditions possible.

Effects of Ionization on the Mucosa of the Frontal Sinuses of Dogs. Dr. Bernard J. McMahon, St. Louis.

Experiments were conducted to determine the cytologic reaction of the normal mucosa of the frontal sinuses of dogs after ionization with a solution of india ink, a 20 per cent solution of neosilvol, a 10 per cent solution of mild silver protein and a 2 per cent solution of zinc sulphate and after exposure to diathermic treatment.

The changes which took place were destructive and constructive. The destructive changes consisted of sloughing of the epithelial cells individually and *en masse* following the use of zinc sulphate and of mild silver protein, and of the occurrence of large numbers of free red blood cells in the subepithelial tissue following the use of zinc sulphate. Constructive changes consisted of marked engorgement of the subepithelial capillaries in all of the specimens and marked mobilization of the polymorphonuclear leukocytes, both within the capillaries and in the adjacent subepithelial tissues following the use of neosilvol and mild silver protein, ionized and nonionized.

It is questionable whether the hyperemia and leukocytosis of the subepithelial tissue more than compensate for the loss of the ciliated epithelium lining the sinuses.

DISCUSSION

Dr. Ralph Albert Fenton, Portland, Ore.: Dr. McMahon has "debunked," if I may use the term, the subject of ionization, and I think has shown conclusively, with the brilliant technic which he is known to possess, that ionization as such does nothing more than damage the mucosal tissues of the sinuses.

He demonstrated also, but collaterally to the study of ionization, that diathermy is of considerable value.

The use of chemicals on the mucous membranes is interesting, and it is heartening to observe that the surface contact of the various agents is sufficient to produce results without the addition thereto of such a traumatizing agency as the galvanic current.

Dr. Robert Sonnenschein, Chicago: I should like to ask Dr. McMahon whether or not he has had occasion to test the claims of Dr. Warwick of Fort Worth, who presented a paper in the March number of the *Laryngoscope* on the combined use of cadmium and another metal electrode in which he claimed that he obtained marvelous results from one treatment and that the results lasted indefinitely in various vasomotor conditions affecting the nose.

Dr. Lee M. Hurd, New York: I wish to ask whether any of the dogs the mucous membranes of which had been ionized were allowed to live long enough for healing to take place and for the observation of the condition after ionization.

Dr. Bernard J. McMahon, St. Louis: In answer to the question about Dr. Warwick's work, I have done no clinical ionization as yet. I do not feel justified in using it as a method of treatment. At any rate, I am open to conviction to the extent of continuing to investigate the damage it may do in conjunction with the good it undoubtedly does do for those who claim to have received benefit from it.

The epithelium, of course, is destroyed, and it is simply a question of how well that epithelium will regenerate and of what damage the fibrosis will do in later years.

Diathermy, I think, caused a decidedly advantageous change in the mucosa, which may be obtained without causing destruction of the epithelium such as follows ionization.

Dogs that were ionized were not permitted to live. The limited time and facilities did not permit the use of more animals and of waiting for a time. Of course, I think that time is a definitely deciding factor in the determination of just how much destruction of mucosa has taken place. At present, one can merely infer and reason that destruction may take place.

TREATMENT OF CHRONIC INFECTIONS OF THE ANTRUM BY INTRANASAL OPERATIONS AND PACKING: CLINICAL AND EXPERIMENTAL RESULTS. DR. HENRY M. GOODYEAR, Cincinnati.

Six years ago, impressed by the results obtained from an intranasal operation on the antrum of a patient who refused a Caldwell-Luc operation, I began a study of a series of cases in which were compared the radical and the intranasal operation. Pictures with opaque oil were taken for comparison before and at periods after the operation.

In this study I have tried to answer some of the following questions: 1. What happens to the cavity of the antrum after the so-called radical and the intranasal operation? 2. Why do intranasal operations fail? 3. What is the important part of an intranasal opening, the anterior or the posterior portion? 4. What instruments are most effective? 5. Should one pack the cavity? 6. Is it important that the wall of the antrum be curetted in the intranasal operation? 7. What are the end-results?

DISCUSSION

DR. ARTHUR WALTER PROETZ, St. Louis: The seat of the disease is in the submucosa, and the opening of the sinus opens the edge of the submucosa, and in that way the drainage is established not only of the sinus but of the submucosa itself.

DR. FRANK R. SPENCER, Boulder, Colo.: I advocate the use of the electrically driven bur. It removes the bone along the floor better than does a cutting forceps or any other instrument. It makes a larger opening which is less likely to fill with granulation tissue, and it saves a tremendous amount of time in making the openings.

DR. KARL M. HOUSER, Philadelphia: The late Dr. George Fetteroff, with whom I had the privilege of being associated for a number of years, invariably used this technic in all cases of chronic disease of the maxillary sinus that failed to yield to absolutely conservative measures, and he reserved the more formidable Caldwell-Luc procedure for patients that failed to respond to this type of surgical procedure. In the cases in which the Caldwell-Luc procedure was finally indicated the patient usually showed at the operation a cystic abscess on a part of the wall which was almost impossible to reach through the opening.

In the making of the window, much of the technic was the same as that of Dr. Goodyear, except that he almost invariably removed the anterior third of the inferior turbinate.

In the Caldwell-Luc operation I have disregarded the accepted principle that every shred of mucous membrane must be removed from the sinus, and I have limited the operative procedure to the removal of the portion of the membrane which was obviously diseased. Since adopting this method, I do not think that in one case the result has been the extreme, thickened fibrotic change of the antrum described by Dr. Goodyear.

DR. LEE M. HURD, New York: I pack the sinus just enough to prevent hemorrhage and remove the packing in twelve hours.

As to the removal of the membrane, the intention is not to clear the whole mucous membrane but to drain the submucosa. The after-treatment is mainly negative.

Dr. Harry W. Lyman, St. Louis: Dr. Sluder did few Caldwell-Luc operations. Nearly all of the infected antrums were taken care of by the intranasal procedure. With his characteristic thoroughness in getting a large permanent opening, he used to detach the anterior two thirds of the lower turbinate, push it out of the way and take out as much of the nasal antral wall as possible. The lower turbinate then fell back into position across this opening, and there was a large opening above the turbinate and a correspondingly large one below it.

Dr. Joseph C. Beck, Chicago: Dr. Goodyear made a statement that if one were able to make a pathologic diagnosis of the lining membrane, a better means would be afforded of indicating the procedure to be followed. I think, as he does, that the uncertainty of diagnosis is the difficulty at the present time, even with the most refined technic—roentgenologic technic, the inspection of the antrum by electrically illuminated instruments or even biopsy.

So, altogether, the result of treatment is questionable, but is it not rational to carry out this procedure first in almost all cases, since there is no specific means of diagnosis?

I think that the thickening of which he is speaking, the narrowing down of the antrum, is due to the existing periosteal and osteal changes that result from the infection.

During his moving picture, Dr. Goodyear showed an instrument for making the primary opening. I wish to place on record a case in which the instrument shown here was being used by my associate, Dr. Getman, in making a primary opening in the antrum; it broke off and slipped down into the bronchus. Especially is this of interest in connection with the medicolegal angle. The instrument could not be removed at home, and the man was sent to Dr. Jackson, who successfully removed it. I think there is now a type of metal that insures against such an accident.

Dr. Thomas E. Carmody, Denver: I wish to ask if in Dr. Goodyear's cases in which the antrums were not closed the membrane had been removed during the Caldwell-Luc operation.

Dr. Chevalier Jackson, Philadelphia: The surgeon is not an instrument-maker. He buys the best instruments he can get. When he breaks them, it is not his fault. He may think so, and he may accuse himself, but it is due to the lack of cooperation from the instrument-maker.

The instrument-maker makes a nasal rasp. It looks like a file, and he hardens it just like a file, which is not necessary. This file is a brittle instrument that will break. To file bone requires a rasp that is relatively soft. The temper ought to be reduced below the breaking point, so that the instrument bends before it breaks. A better way is to extract the temper on the back of the file and to leave only the teeth hard, if that is desired.

The breaking of an instrument in the nose is absolutely unnecessary.

Dr. Henry M. Goodyear, Cincinnati: I think Dr. Proetz's comment is of interest to every one. I have never thought of that particular phase of draining the membrane and of stimulating healing.

I have never tried a bur. I imagine it works well.

Dr. Houser spoke of cystic abscesses found in the wall of the sinus. On several occasions I have had opportunity to treat sinuses of this type—that is, within a month or six weeks after operation—and I found there was still secretion. When this is the case, I usually surmise that there is an area in the cavity not healing properly, and I try to find it by first probing the sinus with an applicator carrying a small amount of cotton. If I find a soft area at any point, I usually massage it hard or press into it a 5 per cent solution of silver nitrate.

The membrane was removed with the Caldwell-Luc operation in all of the cases which I presented. Of course, there is nothing original about this operation. What prompted me to present these observations was the good results obtained by a comparatively simple operation.

At this point, Dr. Gabriel Tucker presented the report of a case and Dr. Arthur W. Proetz showed a film illustrating the effect of drugs on ciliated epithelium and a method for the vertical examination of bacilli and the demonstration of the effects of heat and cold.

THE PHYSICAL NATURE OF MENTAL PROCESSES. DR. GEORGE W. CRILE, Cleveland.

This study is a consideration of the physical factors which enter into the production of mental processes with special relation to the rôle of irradiation and of electrical impulses in the formation of action patterns.

A METHOD OF SPECIFIC TREATMENT IN CERTAIN STREPTOCOCCIC INFECTIONS. DR. HARRY L. BAUM, Denver.

In this report I shall describe a method for the therapeutic use of immune serum taken from patients who have recently recovered from scarlet fever and from other diseases of streptococcic origin. Such serum has been found to be specific in the treatment of a variety of streptococcic infections, even though the disease treated has no clinical relationship to the disease following which the serum was taken.

The donor is bled, and the serum is separated, placed in ampules and stored ready for use when needed. Specificity is indicated by the power of the serum to agglutinate cultures of the patient's organisms. By this means, treatment becomes somewhat better than a haphazard method, and results have so far seemed encouraging.

DISCUSSION

DR. THOMAS E. CARMODY, Denver: I know of a number of cases that have responded well, and I think that the method is going to be of untold value, especially in severe cases.

DR. BERNARD J. MCMAHON, St. Louis: I wish to ask Dr. Baum whether he can determine the virulence of the organism by the serum which he uses to agglutinate the bacteria.

DR. JOHN W. CARMACK, Indianapolis: During the World War, at Camp Taylor, Kentucky, the serum was taken from a number of patients with influenza who had recovered from the infection, and it was used not only intravenously but intraspinally in a few cases of meningitis. There was complete recovery from coma or from unconsciousness to a normal, or an apparently normal, condition. However, 2 patients died within a period of sixteen days of an obstruction in the ventricles.

After returning home from service in the war, I had 3 other cases in which the same treatment was used. It seemed to offer wonderful possibilities when given intraspinally. In all of the cases, death occurred within three weeks, but the patients made remarkable progress in coming out of the coma.

The bacteria which are agglutinated by the patient's blood are not the cause of the trouble in that patient.

DR. BURT R. SHURLY, Detroit: The use of serums, of course, is empirical, and there is much that is not understood about it. The use of human serum has, indeed, wonderful possibilities, as shown in the work with scarlet fever. There is, of course, much to be done. The study is purely in an experimental phase.

In many of the cases of streptococcic infection, the present methods of treatment are all-sufficient. If it is possible to devise a human serum that actually develops immunity, that research should be stimulated in every possible way.

DR. LYMAN G. RICHARDS, Boston: Recently in Boston there has been evolved a substance known as placental extract. This was discovered by a pediatrician in Boston, who noticed that few infants were subject to the ordinary communicable diseases, especially to measles, and he assumed that this might be due to protective substances in the placental tissues and placental circulation.

With this placental extract, measles is avoided or rendered much milder. Whether or not the extract would be equally effective in streptococcic infections I think has not been worked out.

Dr. Harry L. Baum, Denver: My answer to Dr. McMahon's inquiry is that no effort has been made by my co-workers and myself to test agglutinin reactions with different titers. Such tests are customary, I know, but we have used the undiluted serum. Our agglutinations were classified as they appear under the microscope, either with the highest dry or with the oil immersion lens. They may be rapidly observed, so that the reactions of one agglutination were checked by those of the other and both by the control. In that way one could evaluate the rapidity and the completeness of the agglutination and classify the results as plus one, plus two, plus three or negative.

The administration of serum intraspinally is of doubtful value, for if the foramen is closed and the circulation of the spinal fluid is interfered with, one would obtain no better results by putting the serum into the spinal fluid than into the blood stream. It is better to give the serum intravenously than intraspinally.

The method that I have presented should not be reserved only for the hopeless case or for the case which apparently otherwise would end fatally. It should be used as a routine for all streptococcic infections that are severe enough to require serious medical attention.

The immunity thus given by artificial means is lost by the patient after a short time. Of course, the placental extract has the same immunizing action, and when given it has the same effect which the serum of a patient convalescent from measles or from scarlet fever has in preventing or in ameliorating the infection.

Multiple Hemorrhagic Telangiectasia. Dr. Karl M. Houser, Philadelphia.

This condition, well known to the hematologist and to the internist, has rarely been mentioned in the rhinologic literature. Fifty-seven family trees have been described that show indisputable evidence of the disease in its true form. The diagnosis depends on the presence of recurring hemorrhages, frequently nasal, the presence of nevi on mucous membranes or cutaneous surfaces, or both, and a history of the presence of the ailment in various members of the family. The disease affects men or women, and it presents no blood changes capable of explaining the recurrent epistaxis or other hemorrhages.

In this paper a family tree is described in which 11 members distributed throughout four generations were afflicted.

DISCUSSION

Dr. Frederick A. Figi, Rochester, Minn.: During the past year I have had under my care a woman of 52, who gave a history of severe nasal hemorrhages which came on spontaneously fifteen years previously. Often while lying quietly in bed, a profuse nosebleed developed. This condition persisted for some little time, possibly for a year, when she had radium treatment, which resulted in marked improvement but which left her with a large perforation of the nasal septum. Later, she again had hemorrhages, and all types of treatment that were applied at home were of no avail.

At the last time I saw her she was examined thoroughly by a hematologist, who found no blood changes suggestive of hemophilia. Examination of the nose, however, showed a multiple telangiectasis together with a great deal of crusting, undoubtedly secondary to the irradiation that she had received. The vessels in the telangiectatic area were so friable that the slightest touch or dislodgment of the crusts led to profuse bleeding that was controlled with the greatest difficulty.

Contrary to Dr. Houser's experience with electrocoagulation, in this patient's case I found that method the only means of controlling the bleeding, and a relatively high voltage with low amperage gave by far the most satisfactory effect. Otherwise, when there was a spark gap of any width, the spark immediately perforated the vessels.

After several treatments with electrocoagulation at intervals of two months or so, I was able to stop the recurrent hemorrhages.

SOME CONSIDERATIONS OF ACUTE SUPPURATIVE FRONTAL SINUSITIS; FOUR FULMINATING CASES. DR. W. J. MCNALLY, Montreal, Canada.

Four cases are presented of acute fulminating frontal sinusitis in young adults. Prompt, simple external drainage was given. The roentgenograms of the sinuses were misleading in 3 of the cases. In at least 3 of the cases the causative organism was Staphylococcus pyogenes-aureus. At the time of admission, the temperature ranged from 101 to 104 F. Complications developed, *2* patients having abscesses of the frontal lobes, and *2*, osteomyelitis of the skull. All of the 4 patients recovered.

DISCUSSION

DR. HERBERT S. BIRKETT, Montreal, Canada: Many patients with frontal sinusitis first have ocular symptoms, a simple conjunctivitis, and they seek the opinion of the oculist.

I have in mind a patient that I saw in consultation. The swelling and edema of the lids were treated as an ocular condition. The lad was only 18 and had shown the condition following an infection acquired while swimming during the summer.

On the ground of negative findings in the roentgenogram, the patient had been allowed to drift along. I advocated surgical intervention immediately. The sinuses were full of pus, and the mucous membrane had even become colloidal. Yet the whole handling of the case had rested on a diagnosis made from a roentgenogram.

I therefore think that it is time that a good deal of the resting of the diagnosis on mechanical devices be dispensed with and one's own clinical experience be trusted for an opinion.

I agree with Dr. McNally that one is apt to interfere with the frontal nasal duct as a matter of routine, but it is my opinion that the interference is a means of opening up further channels of infection.

DR. E. ROSS FAULKNER, New York: My associates and I had always considered that these cases were more or less emergencies. The mortality following such operations was always high. I was forced to the conclusion that a great many of the patients might be treated conservatively, and in cooperation with Dr. MacKenty I decided to treat them accordingly. In only the most severe cases was immediate operation demanded.

The conservative treatment consists in a thorough shrinking of the nasal mucous membrane and the application of suction. The suction may be applied in many ways, but best with the ordinary nasal tip.

For the method of shrinkage various agents have been used, such as epinephrine and cocaine, but to my mind 10 per cent cocaine is the most satisfactory. The applicator should be used beneath the middle turbinate.

I recall cases with diffuse swelling of the eyelids and extreme tenderness over the frontal sinuses in which the condition cleared up promptly.

The cases in which the blockage is complete and is accompanied by swelling, pain and increasingly high temperature demand surgical intervention. The frontal sinuses are opened, and a drainage tube is inserted. The ethmoids and the sphenoid are opened and cleaned out down to the base plate, as in the operation on the mastoid.

I have seen probably an average of 3 or 4 such cases each year for the last fifteen years, and in adopting this procedure I have had practically no complications.

DR. HERMON W. TAYLOR, Jacksonville, Fla.: I was particularly interested in hearing what Dr. McNally had to say in reference to the negative findings in the roentgenograms in these cases. I have seen 4 such cases, and in all of them the roentgenogram showed a normal picture. There was no shadow.

In the acute cases I think that the roentgenologist has been responsible for part of the belated complications, because one waits too long to see whether the roentgenogram shows anything significant.

DR. WILLIAM B. CHAMBERLIN, Cleveland: I recall 3 fulminating cases, and, as in the experience of Dr. McNally, the infection in each case followed swimming.

I wish to emphasize two points that Dr. Birkett made. The first is that most of these patients are referred to the ophthalmologist, and unless the ophthalmologist is on his guard and refers them, as he should, to the rhinologist instead of looking only for an orbital abscess, he is liable to get into trouble.

I also wish to emphasize the point which Dr. Birkett, as well as the other commenters have made, that one should never neglect the ordinary clinical signs and accept the diagnosis and suggestions of the roentgenologist instead.

Dr. Harry W. Lyman, St. Louis: Of course, all surgeons hesitate to operate for acute surgical conditions, but occasionally a case is seen in which that procedure is imperative.

Dr. Frederick M. Law, New York: I cannot agree with Dr. McNally. All of the films he showed today show positive evidence of involvement of function.

It may be recalled that for years I have contended that one should not depend on the opacity of a film for the diagnosis of frontal sinusitis. All interpretations must be made from the appearance of the bony walls.

Ordinarily, a frontal sinus has an osteitic border and a sharply defined outline. An inflammatory process produces edema. The edema dilutes the lime salts in the mucoperiosteum, and instead of showing a sharp outline it appears to have a fuzzy one, as though one had taken a pencil and drawn a line and then rubbed a finger over it.

Each of the films showed a similar picture; there was no pus. A frontal sinus that is filled with pus will probably show no shadow. A lateral view reveals nothing abnormal. The sinus has to be filled with something besides fluid.

There are two reasons for error. One is the absence of ability to see what one is looking at, and the other is one's own idea of a pretty picture.

Dr. Thomas E. Carmody, Denver: I agree with Dr. Law. After an experience of a number of years with osteomyelitis in the flat bones from the mandible to the frontal sinus, I maintain that frequently an early diagnosis cannot be made from the roentgenogram. The findings in the roentgenogram must be considered with the clinical symptoms.

I saw a case recently that well illustrated what Dr. Law has brought out. The patient came from a small town in the country with a diagnosis of neuralgia. The country doctor wished to make an injection into the nerve because the roentgenogram showed nothing. The roentgenogram showed little because it was a poor one. Another was made the same day, and although it was taken only twenty-four hours after the first, inflammation was shown in the left frontal sinus.

Dr. Law's point regarding the fuzziness of the sinus is good.

Dr. Faulkner spoke of drainage. In the case I speak of there was no drainage in the nose. In the operation a breaking down of one of the anterior ethmoid cells was found that filled the nasal duct. For that reason there was no drainage. I opened the nasal frontal duct and thought better drainage would be obtained. I think that in some of the cases reported by Dr. McNally if the nasofrontal duct had been opened and there had been better drainage the possibility of osteomyelitis would have been lessened.

I agree with Dr. Law that it is not the opacity but the sharpness of the outline that counts.

I am inclined to doubt the explanation that the fuzziness of the outline is due to a solution of calcium salts. In the cases of edema caused by allergic reactions, in which the edema may come and go within a very short time, the sinuses show a sharp outline when they are normal and continue to show it after there is edema of the thickness of a centimeter or so. Whether or not the inflammation takes part in changing the shadow I do not know, but there are certain conditions in which fluid seen against bone does not make a fuzzy outline.

I condemn the use of massive suction in this type of case. The only resistance to aspiration is the resiliency of the air in such a sinus. With a swollen membrane, the capacity of the sinus is greatly reduced. Cases have been reported in which hemorrhages have occurred following suction. This treatment only complicates the situation.

DR. HARRIS P. MOSHER, Boston: I think with Dr. McNally that cases of infection of the frontal sinuses following swimming, for some reason unknown to me, are the most common.

In my opinion, the roentgenogram is from seven to ten days behind the progress of the condition, whether it shows fuzziness or not.

My conscience as a surgeon would not be clear unless I had done in a fulminating case the extensive operation that practically removes the whole forehead and the frontal and posterior walls of the frontal sinuses, leaving the nasofrontal duct alone for the time being. The vicinity of the nasofrontal duct should be respected.

DR. SAMUEL R. SKILLERN, Philadelphia: Recently, 3 cases of acute frontal sinusitis were seen, in which the diagnosis was made by roentgenography. The roentgenogram was taken with three different degrees of density, a soft, a medium and a hard tube; the soft and medium tubes alone showed the fuzziness around the outline of the cavity. The sinuses were opened, and they were found to be filled with pus.

As Dr. Carmody implies, massive suction draws more blood into the tissues and closes off the ostium more tightly than ever.

DR. HARRY L. BAUM, Denver: Although it is true that fluid in the sinuses does not always show, if the roentgenographer takes the picture with the patient in the right position, using horizontal rays in many instances, the perplexing factor will be eliminated quickly and easily, because a level of fluid will be shown.

DR. JOSEPH C. BECK, Chicago: As recently as last Monday, I had a case similar to one described by Dr. McNally. A youth aged 15 had been swimming in a tank; an acute infection of a frontal sinus had developed, but no history of previous disease of the frontal sinuses was given. I saw this patient, however, after the involved frontal sinus had been operated on by another surgeon according to the method described by Dr. Lynch. The sinus had been opened and drained. The nasal frontal duct was not approached.

The boy continued to have severe hemorrhages and showed no improvement of the symptoms. A neurologist, in examining him, thought there must be an intracranial complication. I saw the patient at this time. He showed evidences of meningitis, and it was decided to perform an exploratory operation.

The roentgenograms showed positive evidence of a shadow such as Dr. Law described. The second picture, of course, showed evidence of the recent operation, but no other evidences that would lead one to a diagnosis of osteomyelitis; a tender point in the temporal region, however, was constantly present.

On exposure of the frontal sinus previously operated on, I found a healthy posterior wall, except at the extreme point of the sinus; there I discovered softened bone. I removed the posterior table of the frontal sinus and found a very red dura. No pulsation could be felt. A puncture was made and a fluid abscess was located.

The last portion of the pus to be obtained was thick. A tube was inserted, and, as one would expect, excellent results were obtained immediately. Yesterday the patient was in good condition. How he will be tomorrow or the next day no one can tell, as abscesses of the frontal sinuses are notoriously hard to prognose.

DR. W. J. MCNALLY, Montreal, Canada: The discussion has grouped itself under three headings—the use of suction, the use of the roentgenogram and the extreme or radical operation. It is evident that this condition is not uncommon.

With regard to suction, it has been brought out that there is a possibility of trauma.

The better the roentgenogram is taken and the more one knows about reading it, the less trouble one has in its interpretation.

With regard to the nasofrontal duct, I reviewed the literature in an attempt to find some enlightenment in the cases that were reported, particularly in those with fatal outcomes, from the point of view of the operative technic. I must admit that I arrived nowhere.

If there is no gross evidence of disease in the nose, and the condition looks like an acute one of rapid course, I certainly should hesitate to do an extreme nasal surgical procedure. By this I mean the operation on the ethmoids and the sphenoid. If I saw the necessity of radical procedure, I should prefer to follow Dr. Mosher's custom and remove the whole of the frontal bone.

REPORT OF A CASE. DR. THOMAS E. CARMODY, Denver.

This is the record of a mistake, although the patient was saved, at least for the time being.

I was operating on a patient with carcinoma of the mandible, using diathermy, and unfortunately I did not place a sponge in the pharynx, as I should have done. Avertin anesthesia was being used. Suction was employed constantly, but suddenly the patient stopped breathing.

I quickly performed a tracheotomy, which did no good. Then I immediately did a bronchoscopy. I found that there was a slight opening in the right bronchus, although it was partially filled with blood, which apparently had trickled down. In aspirating this, full expansion of the right lung was apparently obtained.

On looking in the left bronchus, I found it was completely plugged; there was therefore massive atelectasis of the left lung. The blood from the bronchus was removed fairly quickly, and the patient continued to breathe. A tube was placed in the tracheal opening, and the operation was continued. The patient was put back to bed; he made an uninterrupted recovery for about a month, when there was a recurrence of the carcinoma. He was reoperated on, but he subsequently died.

REPORT OF A CASE. DR. ERNEST M. SEYDELL, Wichita, Kan.

A case of cicatricial stenosis of the esophagus following appendicitis is reported.

VARIOUS TYPES OF CONGENITAL ATRESIA OF THE NOSE AND THEIR GENETIC INTERPRETATION. DR. J. PARSONS SCHAEFFER, Philadelphia.

Atresia may (*a*) extend over the greater portion of the nasal field, (*b*) be limited to the region of the nares or (*c*) be restricted to the definite choanae. The occlusion may be absolute or partial; it may be membranous, osseous or a combination of these types.

The several types of atresia and their ontogenetic mechanisms will be described. It will be shown that nothing can be done to correct the developmental error in some types. Likewise, evidence will be presented that in cases of atresia of the nares and of the choanae, the occlusion is frequently of such a character that a free and continuous nasal passage may be established by surgical means.

DISCUSSION

DR. HARRIS P. MOSHER, Boston: I have never seen a case of the kind that Dr. Schaeffer has mentioned, and the description is interesting. I hope the condition is new to the rest of the audience, so that I need not think that I am too far behind the times.

DR. HENRY L. SWAIN, New Haven, Conn.: If in an infant there were a fairly normal opening on one side and, on the other, an almost complete occlusion, would one look for the opening in the upper or in the lower part?

DR. J. PARSONS SCHAEFFER, Philadelphia: I do not know. The opening is more likely to be below or near the center. The osseous occlusion is usually above and extending on the lateral wall.

DR. GORDON BERRY, Worcester, Mass.: Have Dr. Schaeffer's investigations shown a contributing or a causal factor for this condition and whether or not the condition is hereditary?

DR. JOHN M. INGERSOLL, Miami Beach, Fla.: In many of the lower animals, there is a process along the septum which forms immediately a double nasal passage

at the posterior end, above it being the olfactory portion and below it the respiratory portion of the nose. I was wondering if such a process in any way influenced the development of these abnormalities in man.

Dr. J. Parsons Schaeffer, Philadelphia: With reference to Dr. Swain's remarks, I wish to say that it is my opinion that, although the apertures in the membranous septum at the posterior naris are usually in the position given, there is no reason why, if the whole membrane is destroyed by osseous tissue, atresia might not take place to such an extent and perforation occur anywhere.

With reference to the remark on heredity, it would be extremely hazardous to express an opinion in regard to the hereditary aspect of atresias of the nose, because I have not studied enough of the material to pass judgment on it. I have finally come to the conclusion that there are certain aspects of harelip and cleft palate that are probably hereditary, but with reference to the condition of which I spoke this morning, I fear too little is known.

The suggestion made by Dr. Berry is interesting. For a long time I have thought that a detailed comparative study of the anatomic structure of this region in various animals might help to clear up this problem.

The Peritonsillar Spaces. Dr. George B. Wood, Philadelphia.

This article will appear in full in a later issue of the Archives.

DISCUSSION

Dr. J. Parsons Schaeffer, Philadelphia: Dr. Wood, I have just been wondering whether or not, if the pressure had been increased, the barriers in certain muscles might have been pushed into the tissue spaces and been overcome.

I also wish to ask whether the pressure was always the same.

Dr. Joseph C. Beck, Chicago: This presentation was very interesting to me, especially because I have just read in the French literature that the same idea has been tried in France. The investigators went further in using it on living material in cases of peritonsillar abscess, and they pointed out the mistake made by American workers in incising peritonsillar abscesses. They used injections of iodized poppy-seed oil 40 per cent to find the retrotonsillar space and then made stereoscopic roentgenograms in order to determine more exactly the extent of the injected material. It was found that in the great majority of instances the injected material appeared in the upper part or in the supertonsillar area. The point was then to puncture the abscess, the white area in the lower portion of the space, and to withdraw from the abscess, but without complete evacuation, a certain amount of pus. Resolution would then take place, and subsequently a tonsillectomy could be done.

Dr. George B. Wood, Philadelphia: In answer to Dr. Schaeffer's question as to whether or not the barriers would have given way if more fluid had been injected, I cannot say with certainty; the fluid, when it was placed in the tonsillar fossa, extended, quite to the hard palate without the barrier giving way.

I think it important to remember in the application of this study to the use of local anesthesia that one can flood by one puncture practically the whole tonsillar fossa through which the sensory fibers from the glossopharyngeal nerve run to the tonsil. One should be sure of complete anesthesia. The posterior pillar should also be infiltrated.

Tonsillectomy in the Tuberculous Patient. Dr. Horace Newhart, Minneapolis.

Modern technic in the enucleation of the tonsils has materially lessened long-existing prejudice against the removal of tonsils in the tuberculous patient. In properly selected cases surgical risk is practically negligible. Precautions are to be taken in avoiding untoward results.

Tuberculosis of the faucial tonsils was recognized as a clinical entity prior to the isolation of the tubercle bacillus. The existence of tuberculous involvement

of the tonsils in 30,676 cases of tonsillectomy reported in the literature was found to be 2.03 per cent. The incidence of tuberculous tonsils in adults with active tuberculosis, as revealed by autopsy and by microscopic examination, is naturally high.

This report is based on a microscopic study of tonsils removed from 112 adult patients in Glen Lake Sanatorium. The incidence of tuberculosis of the tonsils among this group was found to bear a distinct relationship to the stage of advancement of the pulmonary involvement.

The pathologic appearance of tuberculous tonsils, the statistical data dealing with tuberculosis of this type and certain conclusions are presented.

DISCUSSION

DR. GORDON BERRY, Worcester, Mass.: Dr. Newhart has indicated the freedom from hazard connected with tonsillectomy in the tuberculous patient.

Personally, I have taken the position that other things being equal, the operation is a little more necessary in a case of pulmonary tuberculosis than in the average case, on the basis that a chronic infection of the upper respiratory tract, whether tuberculous or not, is a handicap against recovery.

The speaker has pointed out that the handicap is lessened by preoperative and postoperative care and by attention to the details of the technic. In this connection, the infection of an anesthetic is significant. Dr. Newhart recommended a local anesthetic for adults and a mixture of gas and ether for children. A third anesthetic is available in cases in which a middle ground between the two extremes is desired, namely, avertin with the addition of a little ether. I have found this anesthetic advisable for use in selected cases, for it gives unconsciousness and a quiet pharynx with only a little ether.

DR. FRANK R. SPENCER, Boulder, Colo.: Tuberculous patients usually do not present a good surgical risk, even when they have only incipient pulmonary tuberculosis. They recover slowly from a slight surgical shock, no matter how mild. Fatalities are common, even with minor surgical operations, in patients who have advanced tuberculosis. I realize that Dr. Newhart and his associates are not recommending surgical treatment for this class of patients.

Sometimes patients who have rather advanced tuberculosis are recommended for tonsillectomy through an error on the part of a specialist in diseases of the chest.

There may be present tiny tuberculous ulcers of the pharynx and of the hypopharnx which have not been recognized prior to operation. Following the operation, the ulcers break down rapidly and produce pain on swallowing. A tuberculous patient must be well fed, or he becomes emaciated rapidly. For ten days following a tonsillectomy such a patient usually cannot swallow enough food to avoid a loss of weight. If ulcers are present, the painful swallowing continues after the healing of the tonsillar wounds. The wounds may become infected from contact with sputum. Spraying the pharynx with a mild alkaline antiseptic solution removes the mucous. Then if a 1 or 2 per cent solution of fluorescein is used as a spray and the excess fluid removed by a second spraying with the alkaline antiseptic, the tiny ulcers will show as fine green dots.

Improved methods of local anesthesia have made tonsillectomy an easier operation for the tuberculous patient, and in carefully selected cases the prognosis is much better than formerly.

Ether is always a dangerous anesthetic for any patient, whether an adult or a child, who has pulmonary tuberculosis, even though the disease is arrested and though the internist assures one there is no activity and no infected sputum. I have seen patients suffer from a reactivation of pulmonary tuberculosis after a brief ether anesthesia and require a year for recovery from the damage done. I have seen this not once but many times.

Tuberculous patients snatch at straws. They welcome anything which they think may help them. They are likely to criticize end-results if they are not cured by an operation.

Some years ago, at the Mayo Clinic, 6 per cent of the tonsils removed as a routine revealed microscopically an occasional tubercle. The late Dr. Robertson of Chicago found that 8 per cent of the tonsils he had removed were tuberculous. I found but 1 per cent to be tuberculous in a series of 100 cases in Colorado. The patients were not tuberculous in any of the series, and tuberculosis was not suspected prior to microscopic examination. Each tonsil which was diagnosed as tuberculous had at least one caseating tubercle containing tubercle bacilli.

Dr. Mervin C. Myerson, Brooklyn: I think that if the patients are properly selected and if they do not have tuberculosis of the larynx and have no acutely active lesions the operation is safe if properly handled from the technical standpoint.

Dr. Burt R. Shurly, Detroit: A long experience of thirty years with tuberculosis and careful observation have proved to me certain definite facts that I think are worth considering.

I confirm the statement that there is exceedingly grave danger in the use of ether in performing a tonsillectomy in a case of pulmonary tuberculosis, whether quiescent or not. I have seen dreadful disasters, not only in the institution with which I am associated but in other institutions, apparently from the use of ether, which caused an exacerbation of the tuberculous lesion.

In 15 per cent of the cases in my experience, through a period of thirty years, laryngeal ulceration developed during the course of the disease.

Dr. George B. Wood, Philadelphia: My interest in tuberculosis began when I was connected with the Phipps Institute. On 3 private patients sent to me by Dr. Phipps I did tonsillectomies under ether, and within six months all were dead. I have since then been wary about recommending tonsillectory for a person with a pulmonary lesion of any type, though I realize that a patient who has repeated attacks of tonsillitis or has some other strong indication for tonsillectomy —and it must be strong—in my opinion may wisely be subjected to tonsillectomy, provided a general anesthetic is not used. I much prefer to take the time to remove the tonsils either with the electric cautery or by coagulation.

I have never seen a disaster follow the removal of tonsils by this method in a tuberculous patient.

Dr. Lee M. Hurd, New York: Some years ago I undertook a study of the structure of the tonsils of patients with tuberculous cervical glands, and in the series of 12 I found 9 patients with positive evidence of tuberculosis of the tonsils.

I then contended with the general surgeon that removal of the infected glands of the neck could not cure his patient until the primary source, the tonsils, was removed. I have confirmed my opinion that in nearly every case in which tuberculosis of the cervical glands exists there is a tuberculous lesion in the tonsils.

Dr. William V. Mullin, Cleveland: One way by which one knows tuberculosis is to live with a person who has it. Another good way of knowing it is to have it oneself.

I think that one must carry on this work of caution in regard to surgical procedure in the tuberculous patient. Persons with tuberculosis acquire acute infections. Acute infections of the ear develop. The affected ear must be opened. Sometimes mastoidectomy must be done on such a patient but when the operation is done one does not get a normal response from the tissues. In a goodly number of cases the ear does not heal as it does in a normal patient. In a good many instances the cavity left by the mastoidectomy does not heal.

Dr. Henry Hall Forbes, New York: Infiltration anesthesia for tuberculous patients, in my experience, has been very satisfactory.

Dr. Horace Newhart, Minneapolis: I admit that my associates and I have been extremely fortunate in the end-results, and that the total number of cases is relatively small on which to base a wide, sweeping statement. Yet I make the plea that there are patients who undoubtedly make a better recovery after the removal of something which is interfering with recovery.

MALIGNANT DISEASE OF THE TONSIL. DR. LEROY SCHALL, Boston.

These patients were seen between the years 1918 and 1934. In only 48 was the disease limited to the tonsils. In only 19 was there no evidence of glandular enlargement. The average duration of symptoms before relief was sought was six months. Only 22 were alive on Jan. 1, 1934. The evolution in the treatment since 1918 is discussed, and the conclusion is reached that surgical intervention has no place in the treatment of this disease. Major emphasis should be placed not on the duration of the patient's survival but on the palliative relief afforded by proper treatment.

OPERATION FOR REMOVAL OF CARCINOMA OF THE FAUCIAL TONSIL AND THE CONTIGUOUS PARTS. DR. DUNCAN MACPHERSON, New York.

This is a one or a two stage operation.

In the two stage operation in external carotid it tied, and diseased cervical glands are removed two weeks before the excision of the tonsil.

Approach to the tonsil, to the base of the tongue and to the lateral pharyngeal wall is accomplished through a central pharyngotomy, one half of the hyoid bone being removed in the process and the muscular attachments severed.

Diathermy or a knife and scissors may then be used to excise the diseased tissue. The pathologic portion of the palate is attached through the mouth.

DISCUSSION ON TWO PAPERS JUST PRESENTED

DR. JOSEPH C. BECK, Chicago: One must have been particularly impressed with the fact that over a period of years there has been a high percentage of recovery in cases of malignant disease of the tonsil and neighboring parts with the use of radiation, especially beta radiation.

The Shinz and also the Coutard school have worked in this field particularly, and they have laid down a ruling as to the type of treatment to be applied and as to what the result may be, especially in regard to distant irradiation with large doses of radium. Dr. Schall mentioned that that type of treatment was not tried out because it requires a larger dose, at least 4 Gm. of radium. A little less than that amount was used by Berven. Probably the best statistics are those given by Berven of Stockholm. He gave only 3 Gm. and obtained good results with radium pack.

For a year or more in Chicago workers have been privileged to see at least good immediate results from treatment under the guidance of Dr. Max Cutler, director of the tumor clinic of the Michael Reese Hospital. He uses a radium "bomb" in this type of disease, strictly limiting it to infections of the tonsil. He has shown, by first carefully analyzing the case from the histopathologic point of view, and then administering the proper doses as especially developed at the Memorial Hospital, New York, that this type of treatment has given the best results.

The operation which Dr. Macpherson described I have performed, and I hope he will have better results than I in the permanent eradication of the disease. I have operated in a number of these cases in which granular involvement was present, and the condition recurred. I know I do not operate as well as Dr. Macpherson, but that is what happened in my cases.

DR. ERNEST M. SEYDELL, Wichita, Kan.: I wish to speak for a few minutes on the dosage of roentgen rays for tissues. Drs. Martin and Quick of the Memorial Cancer Hospital have shown that from 7 to 10 erythema doses are required to destroy a mature type of carcinoma—in other words, from 7,000 to 9,000 r (roentgens). When one gives from 7,000 to 9,000 r, one is going to destroy the lives of a great many patients. Martin and Quick have also shown that when 4,000 r have been delivered to the center line of the throat, there is so much reaction that death is liable to occur.

If the carcinoma is of the adult type, 7,000 r must be delivered to all parts of the cancer. Consequently, Berven, who I think has had the best results, states that it is impossible to use roentgenotherapy for the adult type of cancer so far as external irradiation is concerned; he combines the radium pack, radium implantation and diathermy to destroy any tissue that may remain.

In this series of cases about 6 per cent of the carcinomas were of the transitional cell type. At the Memorial Hospital it has been found that about 16 per cent of the tumors in this vicinity are of transitional cell type. This type of carcinoma may be destroyed with from 3,000 to 4,000 r.

Dr. Duncan Macpherson, New York: My intention in bringing this operation to attention was to show the fine view and the fine approach that one may make in surgical treatment. I did not say anything about the use of this means as against that of radium. Personally, I use radium first in all of my cases of malignant disease, and I use it after the operation.

I did not know that any one had employed the method of approach by the removal of the hyoid bone, which permits a view of the lower portion of the tonsils and an approach for cutting and for diathermy that cannot possibly be obtained by the lateral methods of approach or through the mouth.

Dr. Joseph C. Beck, Chicago: I did not mean to imply that I use that special technic. I meant that I have operated for tonsillar carcinoma by external pharyngotomy, and was unsuccessful.

Methods of Treatment of Supraglottic Tumors, with Illustrative Cases.

Dr. Frederick A. Figi, Rochester, Minn.

Malignant tumors of the supraglottic portion of the larynx, including the epiglottis, usually have been excised through a pharyngotomy opening, or after dividing the mandible and splitting the tongue. In a group of these cases seen at the Mayo Clinic, removal of some of the lesions by a more conservative procedure has proved satisfactory. This report is presented, not as a statistical study, but rather with the idea of reviewing therapeutic measures of value and of emphasizing methods of approach and of treatment the usefulness of which in the treatment of these tumors apparently is not generally appreciated.

DISCUSSION

Dr. Henry Hall Forbes, New York: Some of the older laryngologists have had the advantage of using the suspension laryngoscope. This instrument gave excellent exposure to the base of the pyriform sinus and, of course, to the supraglottic region.

For the exposure of the base of the tongue, I have devised a broad-tongued spatula, which is ideal for that purpose.

Dr. Thomas E. Carmody, Denver: I used ether anesthesia in these cases for a number of years, but always with a great deal of fear that an explosion might occur. For the past two years my associates and I have been using avertin. We use avertin alone in most of the cases. Sometimes it has to be supplemented with chloroform rather than with ether. We have not had any trouble.

Dr. Frederick A. Figi, Rochester, Minn.: Regarding anesthesia, I admit that I have encountered explosions on two occasions, but it was my own fault in both instances. One of these was serious; the other was not.

Avertin has not been used in this group of cases.

Dr. Gabriel Tucker, Philadelphia: On one occasion I was asked to perform a bronchoscopy on a patient after an ether explosion. Diathermy had been used around the face, and the ether had exploded. I found a rupture of the trachea, and the larger bronchi, as far down as I could see, were ruptured.

ABSCESS OF THE LARYNX. DR. JOHN D. KERNAN, New York, and DR. HENRY P. SCHUGT, New York.

The literature, the symptomatology, the pathology and the treatment of abscess of the larynx and allied conditions are reviewed, and the treatment and management of abscess of the epiglottis, the arytenoid, the thyroid and the cricoid cartilages are presented in detail. Seven cases of abscess of the larynx will be presented and illustrated with lantern slides.

Special emphasis is laid on abscesses of the thyroid cartilage which manifest themselves in the pyriform fossa. A method of draining such abscesses as developed by us will be presented.

DISCUSSION

DR. GEORGE B. WOOD, Philadelphia: I have seen only 3 cases of laryngeal abscess—2 of the epiglottis and 1 of the arytenoid cartilage—and in these the abscesses were superficial. Simple intrinsic incision resulted in recovery.

I recently saw a patient in whom severe symptoms developed within a few hours. When I first saw him at 3 o'clock edema of the right arytenoid threatened closure of the larynx, and there was beginning edema of the left arytenoid. I could not see into the larynx at all. He had edema of the lateral wall of the pharynx and beginning edema of the left posterior pillar of the fossa. The process looked like a very active, spreading infection of some kind. In twelve hours the condition had progressed so that I thought tracheotomy might be necessary in the course of the next few hours. Dr. Clerf saw the patient. The man gradually got better after three weeks. Dr. Clerf incised the left arytenoid and the pyriform fossa, but he obtained no pus.

DR. THOMAS J. HARRIS, New York: Radium had been used in the treatment of a distinguished member of the medical profession for an early cancer. Not as much was known about radium then as now, but the thought was that the massive dose or the strong dose was required to secure an effect which the small dose had not produced. The strong dose resulted in abscess of the larynx. There was necrosis of the cartilages which completely shut off the laryngeal airway. A tracheotomy was required, and the victim for many months fought the effects of the ulceration of the throat more than the cancer itself, keeping the tracheotomy tube in place all the time. At the end of a year he succumbed, I think more from the effects of the radium than from the effects of the cancer. No operation other than the tracheotomy was done.

DR. D. CROSBY GREENE JR., Boston: I have had considerable experience with radium in connection with perichondritis and abscess of the larynx, and it has made me cautious in the use of radium. Cartilage is particularly vulnerable to radium.

Before attempting to operate on the abscess in serious cases—I am not referring to the mild cases—a tracheotomy should be done; one may then proceed with other measures if necessary.

DR. LOUIS H. CLERF, Philadelphia: The patient referred to by Dr. Wood presented an interesting problem. On the basis of its appearance, the larynx should have been abscessed, but when one considered that the symptoms were of twelve hours' duration and that the entire right side of the larynx was involved, it did not seem that the inflammatory process should progress so rapidly. The possibility of allergy was considered, but of course the condition did not support the view that it was an allergic manifestation or edema.

The patient was kept under observation, and, as Dr. Wood reported, he ultimately made a complete recovery, in spite of my attempts to find pus, which were more or less conservatively applied, as I simply punctured the mucosa of the arytenoid and the tissues farther forward.

I was interested in Dr. Kernan's presentation of his treatment of this condition. I have had an opportunity of seeing a number of cases, and I am in agreement with Dr. Kernan's and Dr. Schugt's methods. In order to avoid, if possible, involvement of the cartilages, prompt surgical treatment should be applied.

Chronic stenosis that cannot be removed by anything less than the rather formidable procedure of laryngostomy may thus be avoided.

Dr. Henry L. Swain, New Haven, Conn.: One of the first serious cases I had in laryngologic practice was one similar to that of the patient to whom Dr. Schugt referred as having typhoid. A tracheotomy was done immediately, the condition cleared up and the patient improved somewhat, so that he was up and around, but one night he died following a profuse hemorrhage. Pus was coughed up at this time in large quantities. At autopsy the cricoid cartilage was seen to be almost completely necrotic.

Dr. Harris P. Mosher, Boston: In my opinion, in cases of this type this method of approach to deep suppurative lesions in the neck is the proper one.

Patients with such conditions always give one considerable concern and worry.

Dr. James A. Babbitt, Philadelphia: Some years ago I reported a case in which there was considerable edema of the arytenoids with the formation of an abscess around the larynx. This condition occurred in a patient with a carcinoma of the intestine, and the laryngeal condition was evidently induced by trauma incident to gavage.

He was not operated on, but within ten days he coughed out two masses that were later identified as the arytenoid cartilages.

Dr. John H. Foster, Houston, Texas: In cases of infection of the larynx with formation of pus one is dealing with two entirely different classes of infections.

The first type is often due to traumatism, to wounds of the mucous membrane by foreign bodies, with formation of pus in the soft tissues. Perforation, puncture and drainage readily cure these infections.

The other type is represented by perichondritis, which presents a different problem in cure.

Dr. William V. Mullin, Cleveland: One can do extensive surgical work on all other parts of the larynx, but if abscess or perichondritis attacks the cricoid cartilage collapse of the larynx ensues, and it is in such cases that stenosis occurs. If the cricoid is entirely destroyed, it is almost impossible to obtain an airway afterward.

Dr. Mervin C. Myerson, Brooklyn: Experience has taught me—and I think that Dr. Kernan's experience also indicates—that the bacteriologic findings in a given condition, if determined early enough, will lead toward the proper therapy. For instance, a streptococcic infection indicates a much more grave prognosis than a staphylococcic infection. It also indicates the possibility of recurrence and indicates the possibility of fixation of both the cricoid and the arytenoid, so the patient may have to wear the tracheotomy tube permanently.

Dr. Lee W. Dean, St. Louis: I think it should be added to the record that actinomycosis is not an uncommon histologic factor in chronic abscess of the larynx and must be taken into consideration in the therapy.

Dr. John D. Kernan, New York: All but 2 of our cases were instances of acute infection of the larynx, and the infecting organism in all of the cases was a streptococcus, so that the therapy in the cases due to radium, the cases of cancer and the cases of actinomycosis does not apply to them. The treatment in cases of actinomycosis would apply to those of chronic abscess of the larynx.

It seems to me that the question of the handling of these cases is boiled down to the question of whether one should do a tracheotomy at once or trust to the immediate incision of the soft parts to reduce swelling and edema and then perform a tracheotomy and other surgical procedures later if indicated.

Dr. Schugt and I are inclined to think that prompt incision of the inflammatory swelling of the edematous parts will control the situation in a large number of cases.

Effect of Radium Emanations on the Laryngeal Cartilages. Dr. M. F. Arbuckle, St. Louis, and Dr. Robert E. Votaw, St. Louis.

This article will appear in full in a later issue of the Archives.

DISCUSSION

Dr. D. Crosby Greene Jr., Boston: The statement made by the writer and the reader that thus far no good results have been obtained by radium is not true from my experience. I observed a patient who was cured. She was well when I last saw her, six years ago.

The important thing is the matter of screening. It is necessary in treating tumors, especially in the vicinity of the cartilage, to avoid the penetration of alpha and beta rays from the radium.

Dr. Frank R. Spencer, Boulder, Colo.: Radium has been recommended for a number of conditions in the larynx, as is well known. It was recommended some years ago for laryngeal tuberculosis.

One of the professors at the university had rather mild pulmonary tuberculosis and moderately severe laryngeal tuberculosis for some years and was very anxious to have radium used in the larynx. I was doubtful about the final outcome, and for fear of damage to the cartilage my consent to the use of radium was reluctant. It was administered by a capable roentgenologist in Denver.

The patient had a severe reaction in the worse side of the larynx for about a year following the use of radium. The radium was used four or five years ago. Since that time his larynx has greatly improved. He has not had necrosis of the cartilage, and he has a reasonably good voice, with sufficient restoration from the tuberculous condition to carry on his teaching.

Dr. Thomas J. Harris, New York: The writer of this paper has brought forward another contribution to a profoundly interesting subject, one in which I have been interested from the time that I used radium not for malignant but for benign growths in the larynx. What he has done in the way of experimental work is beneficial, but I think that anything coming from this association should be carefully considered. It is my earnest conviction that nothing has been shown to prove that it is wise to use radium in the treatment of malignant disease of the larynx.

I am not acquainted with any case on record of a patient who can be said to have recovered owing to the use of radium. In one case, which Dr. Imperatori reported before this Association some years ago, the patient did get well, but Dr. Imperatori specifically stated that operative work had been done.

This is not a discussion of the treatment of malignant disease of the larynx, but I should like to say that in New York one has for the last year or two years been hearing with a great deal of interest and a great deal of instruction reports from Bellevue Hospital and from the Medical Center, particularly of the use of high voltage roentgen therapy, not of radium. The results at Columbia are decidedly encouraging. In some of the cases life has been prolonged over a considerable length of time. I am not sure that in any case a cure is claimed, but certainly conditions that were distinctly and decidedly inoperable have been treated with great benefit by the use of the method, which is peculiar and new and therefore is to be recommended.

Dr. LeRoy A. Schall, Boston: I wish to add my opinion to that of Dr. Arbuckle on the use of radium implantation plus roentgen irradiation of high voltage for inoperable malignant disease of the throat. I hold that the more methods and the more avenues of attack that are used in these cases, the better the chance of prolonging the patient's life.

The effect of ossification of the thyroid cartilage on the efficiency of external irradiation should also be remembered. The ossification of the cartilage acts as a filter, as a barrier; and in such cases the effects of external irradiation are not as good as in cases in which ossification has not taken place.

Dr. John H. Foster, Waterbury, Conn.: I think that Dr. Arbuckle is to be much commended for making an honest effort to determine the dosage of radium that can be used in the cartilage without damage.

I think that this Association and the journals should stress the point that any one who reports the use of radiation for any condition should be required to give definitely the technic used.

Dr. Frederick A. Figi, Rochester, Minn.: One important factor that perhaps was not investigated as much as some would like in connection with the histologic studies of the cartilage is the element of time.

There apparently are secondary changes due to irradiation, whether or not they are due to changes in the vascularity or are small areas of necrosis that are produced by the radium and lie dormant until infection sets in. Not infrequently in these cases after the lapse of a number of months or a longer time—one sees a breaking down of the tissues. That is observed frequently in the soft tissues of the hypopharynx.

Dr. Henry Hall Forbes, New York: I recall the history of a woman of 37 with carcinoma of the larynx whom I treated with radium; after eight years there has been no recurrence.

That is the only case. Dr. Harris and I think that Dr. Imperatori and I may be the only New Yorkers who in the early work were able to report a cure.

About twelve or fourteen years ago there was a roentgen ray tube that some one developed for use in the treatment of malignant growths of the cervix. I am wondering if there is more virtue in high voltage or even in superficial roentgen therapy and why with suspension laryngoscopy such a tube could not be used, but with a shorter exposure than formerly.

Dr. Joseph C. Beck, Chicago: Dr. Arbuckle should be complimented in attempting to show the action of irradiation of the cartilage. Perhaps the cartilage of experimental animals is not exactly like that of man and the effect must be evaluated on the basis of the type of tissue.

I want to make a point in connection with the use of radiation in cases of operable growths that subsequently come to operation anyway. The late Dr. MacIntyre demonstrated in many, many cases the disastrous results from operating on a larynx after it has been irradiated.

Dr. M. F. Arbuckle, St. Louis: The fact remains that in many clinics in Europe workers whose sincerity of purpose and honesty cannot be questioned are carrying on interesting studies and getting interesting results from the treatment of cancer of the throat, larynx, hypopharynx and neighboring structures by irradiation.

Laryngeal Paralysis Due to Lead Poisoning. Dr. M. C. Myerson, Brooklyn.

Involvement of the larynx due to lead poisoning is a rare condition. The literature on the subject is reviewed, and all the reported cases are tabulated. A recent experience is added, making a total of 20 cases of paralysis of the larynx due to lead intoxication. The occurrence of paralysis of the interarytenoid, cricothyroid and adductor muscles in this series seems to challenge the validity of Semon's law. In several instances, the paralysis disappeared after appropriate therapy. In cases of the paralysis of the larynx of obscure etiology, the possibility of lead intoxication should be considered.

DISCUSSION

Dr. George B. Wood, Philadelphia: Is the paralysis peripheral or is it possibly central?

Dr. William B. Chamberlin, Cleveland: As I understand it, the postulates which Semon drew from his observations were these—they referred not to toxic conditions as occur in lead poisoning but rather to pressure, such as that from a new growth. Certainly in such a condition of pressure from a new growth, glands or other agents, all are agreed that the abductor fibers degenerate more quickly than the adductor fibers and that the cords go into the position of permanent adduction. That is the reason the patients have a fair voice but have great difficulty in breathing.

I wish to ask Dr. Myerson if Semon's law applies to paralysis from pressure or not.

DR. FREDERICK THAYER HILL, Waterville, Me.: In addition to the possible etiologic factors mentioned by Dr. Myerson, it has been suggested that the use of certain cosmetics, especially lipstick, some varieties of which contain lead, might be considered as a factor.

DR. JOSEPH C. BECK, Chicago: I wish to ask Dr. Myerson what he thinks of the work of Dr. Negus in connection with Semon's law and of the importance it plays in the discussion going on now regarding the sympathetic nerves. There was quite a bit of discussion last year.

DR. M. C. MYERSON, Brooklyn: In answer to Dr. Wood, I reviewed the different theories that have been advanced for the involvement of muscles due to lead poisoning, and I found that the larynx could be involved centrally, muscularly or by way of the nerves.

In answer to Dr. Chamberlin, it was my impression from the writings of Semon that he did not mean pressure, but I may be mistaken. Two Englishmen published an article citing a case of carcinoma of the esophagus with glandular involvement in which one muscle after another of the larynx was paralyzed, selected by this oncoming intrusion of the growth in the glands. Peculiarly, the adductors were first involved; all of the muscles of the larynx were examined histologically after autopsy and were noted to show much less degeneration and atrophy than did the abductors.

So if Semon's law pertains to paralysis from pressure, this paper emanating from England about ten years ago absolutely disproves it.

There are many sources of lead poisoning unknown even to those who are industrial hygienists, who are interested in lead poisoning and have done a great deal of research on the subject. As Dr. Hill mentioned, lipstick is one of the sources.

I believe that Dr. Negus' work and the work of some of the other men in this country bid fair to change the conception of laryngeal paralysis.

Book Reviews

Anatomie der Hörrinde als Grundlage des physiologischen und pathologischen Geschehens der Gehörswahrnehmung. By Max de Crinis, Direktor der Psychiatrischen- und Nervenklinik an der Universität Köln. Price, 6.60 marks. Pp. 44, with 22 illustrations. Berlin: Julius Springer, 1934.

This is a brochure of forty-four pages devoted to an intensive study of that portion of the brain cortex having to do with hearing. De Crinis first discusses the anatomy of this region and furnishes histologic illustrations. The next chapter is devoted to the physiology of this region, with a consideration of the localization of the perception of sound and the localization of the perception of loudness and intensity. The final chapter is a discussion of the anatomic findings in the cortex in deafness.

One recognizes in this book a distinct contribution to the knowledge of a region about which comparatively little has been known.

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Secretary: Prof. Dr. C. E. Benjamins, Verlengde Heereweg, 143, Groningen, The Netherlands.

NATIONAL

AMERICAN MEDICAL ASSOCIATION, SCIENTIFIC ASSEMBLY, SECTION ON LARYNGOLOGY, OTOLOGY AND RHINOLOGY

Chairman: Dr. John J. Shea, 1918 Madison Ave., Memphis, Tenn.
Secretary: Dr. Gordon B. New, Mayo Clinic, Rochester, Minn.
Place: Atlantic City, N. J. Time: June 10-14, 1935.

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

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Place: Cincinnati. Time: 1935.

AMERICAN BRONCHOSCOPIC SOCIETY

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AMERICAN LARYNGOLOGICAL ASSOCIATION

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Secretary: Dr. W. V. Mullin, 9204 Euclid Ave., Cleveland.

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY, INC.

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Mid-Western.—Chairman: Dr. Edward H. Cary, Medical Arts Bldg., Dallas, Texas.
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President: Dr. S. J. Crowe, Johns Hopkins Hospital, Baltimore.
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* Secretaries of societies are requested to furnish the information necessary to keep this list up to date.

† Deceased.